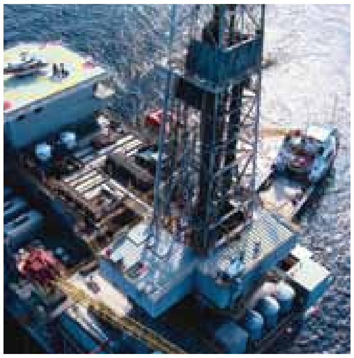




aerospace
climate control
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filtration
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hydraulics
pneumatics
process control
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Denison GOLD CUP® Product Catalog Piston Pumps & Motors

For Open & Closed Circuits

HY28-2667-01/GC/NA,EU
Effective: June 01, 2013



ENGINEERING YOUR SUCCESS.

Hydraulic Pump Division and Denison Hydraulics

The Hydraulic Pump Division of Parker Hannifin was formed in 2004 when our significant piston pump business was expanded through the acquisition of **Denison Hydraulics**. The addition of **Denison** allowed us to marry the wealth of knowledge that both companies have in the design, manufacture, and application of piston products in both open circuit and closed circuit system applications. Since before WWII, **Denison** products have been chosen for Military test stand applications and for shipboard hydraulic applications being recognized as technology leaders.

The heavy duty **GOLD CUP®** series of pumps and motors in this catalog represent a broadening of our product offering with hydrostatic transmission applications in marine, drilling, and shredding applications, among others. The tried and true design of the **GOLD CUP®** product line incorporates features such as integral servo and replenishing pump, hot oil shuttle, and a unique servo control system; all of which combine to provide a rugged self contained package which can withstand the harshest of conditions and continue to perform with trouble free long life.

The division is a leading worldwide manufacturer of hydraulic components and systems for earthmoving and construction vehicles; for mining equipment; for pulp and paper, chemical and other processing equipment; for ships and ordnance equipment; and for such in-plant machines as machine tools, plastic molding, die casters, and stamping presses.

Parker

DENISON Hydraulics

WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

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Contents

Series		Terms	P6	P7	P8	P11	P14	P24	P30
Displacement	*Max. displacement*	in^3/rev.	6.00	7.25	8.00	11.00	14.00	24.60	30.60
		cm^3/rev.	98,3	118,8	131,1	180,3	229,5	403,2	501,5
Pressure	*Continuous*	psi	5000	5000	5000	5000	5000	5000[1]	5000[1]
		bar	350	350	250	350	350	350[1]	350[1]
	Intermittent	psi	6000[7]	6000[7]	5000	6000[7]	6000[7]	5500[1][7]	5500[1][7]
		bar	420[7]	420[7]	310[7]	420[7]	420[7]	370[1][7]	370[1][7]
Speed (*Pump*)	*max. @ full stroke*	rpm	3000	3000	2100	2400	2400	2100[2]	1800
(*Motor*)	*max. @ full stroke*	rpm	3000	3000	NA	2400	2400	2100[2]	1800
(*Motor*)	*max. @ 50% stroke*	rpm	3600	3600	NA	2800	2800	2100[2]	1800
Mounting	*Flange -2 bolt*	SAE	127-2 (C)	127-2 (C)	127-2 (C)	-	-	-	-
	Flange -4 bolt (opt. on 6,7 & 8)	SAE	152-4 (D)	152-4 (D)	152-4 (D)	165-4 (E)	165-4 (E)	177-4 (F)	177-4 (F)
	Shaft - keyed	SAE	32-1 (C)	32-1 (C)	32-1 (C)	44-1 (E)	44-1 (E)	50-1 (F)	50-1 (F)
	keyed	SAE	44-1 (D)	44-1 (D)	44-1 (D)	-	-	-	-
	Shaft - splined	SAE	32-4 (C)	32-4 (C)	32-4 (C)	44-4 (E)	44-4 (E)	50-4(F)	50-4 (F)
	splined	SAE	44-4 (D)	44-4 (D)	44-4 (D)	-	-	-	-
Weight (*Pump) less controls*		lbs	175-300	175-300	175-300	325-530	325-530	750-835	750-835
	Mass	kg.	80-135	80-135	80-135	145-240	145-240	340-375	340-375
Weight (*Motor Fixed)*		lbs	110	110	N/A	250	250	510	600
	Mass	kg.	50	50	N/A	110	110	230	270
Weight *(Motor Variable) less controls*		lbs	110	110	N/A	300	300	650	670
	Mass	kg.	50	50	N/A	135	135	290	300
Rotating inertia		$lbs\text{-}in^2$	92	92	92	290	290	821	977
		$kg.m^2$	0,027	0,027	0,027	0,085	0,085	0,240	0,286
Torque *(Motor) theo. max.*	*per 100 psi*	lbs-in	95.5	115.4	NA	175	222	392	487
	per 100 bar	Nm	157	189	NA	287	362	623	797
	at 5000 psi	lbs-in	4774	5769	NA	8750	11100	19576	24351
	at 350 bar	Nm	539,5	651,9	NA	990	1250	2158	2752
Power *(Motor) theo. max.at 5000 psi, 350 bar*									
	per 100 rpm	hp	7.6	9.2	NA	13.8	17.6	31.1	38.6
		kW	5,7	6,8	NA	10,3	13,1	23,1	28,8
	at 2000 rpm	hp	151.5	183.1	NA	277.8	353.5	621.3	695
		kW	113,0	136,6	NA	207,0	263,7	463,5	518,2
Torque *(Motor) efficiency*	*- approx. stalled*	% theo.	81	81	NA	81	81	81	81
	running	% theo.	93	93	NA	93	93	93	93
Case pressure:	*max. allowable continuous*	psi		75	75	75	75	75	75
	bar	5,2	5,2	5,2	5,2	5,2	5,2	5,2	5,2
	intermittent	psi	125	125	125	125	125	125	125
		bar	8,6	8,6	8,6	8,6	8,6	8,6	8,6
(*Not to exceed 25 psi,1,7 bar above inlet in open circuit units)*									
Flow *(Pump) theo.at max.displ.@ 1500 rpm*		gpm	39	47	52	71	91	160	199
		lpm	148	178	197	269	344	606	753
	@1800 rpm	gpm	47	57	62	86	109	192	238
		lpm	178	216	235	326	413	727	901
Displacement	*(Internal aux. pump)*		**P6,7,8P,S,V**	**P11,14P,S**	**P11,14V**	**P24P**	**P24S**[3]	**P30P**	**P30S**[3]
		in^3/rev.	1.07	(2) 1.07[4]	1.07[5]	2.81[6]	2.81[6]	2.81[6]	2.81[6]
		cm^3/rev.	17,5	(2) 17,5	17,5	46,1	46,1	46,1	46,1
Flow *(Internal aux. pump)*	*@1500 rpm*	gpm	6.9	(2) 6.9	6.9	18.2	6.5	18.2	6.5
		lpm	26,1	(2) 26,1	26,1	68,9	24,6	69,1	24,6
	@1800 rpm	gpm	8.3	(2) 8.3	8.3	21.9	7.8	21.9	7.8
		lpm	31,4	(2) 31,4	31,4	82,9	29,5	82,9	29,5

1) Max. pressure 5000 psi, (350 bar) for M24 and 30 series variable motors. Higher servo pressure may be required - consult Parker.

2) On HF-1 fluids, 1800 RPM Max. on HF-0 fluids.

3) Internal cartridge provides servo flow and must be supercharged from external replenishing flow, from external auxiliary pump.

4) One servo cartridge and one replenishing cartridge.

5) Servo cartridge only.

6) Standard, other sizes available, see ordering code.

7) 10% of operation time, not exceeding 6 successive seconds.

		P6,7,8,11,14,24P	P6,7,8,11,14,24S	P30P	P30S
Replenishing pressure *(Internal aux. pump)* *Replenish pressure minus case pressure*	psi	180-220	*180-220	180-220	*180-220
	bar	12,4-15,2	12,4-15,2	12,4-15,2	12,4-15,2
Servo pressure *(Internal aux. pump)*	psi	308-420	308-420	308-420	308-420
Servo pressure minus case pressure at 0 psi, 0 bar discharge pressure	bar	21,2-29,0	21,2-29,0	21,2-29,0	21,2-29,0
Servo pressure *(Internal aux. pump)* *(Above repl.)*	psi	500-650	500-650	500-650	500-650
for HI-IQ control units. Servo pressure minus case pressure at 5000 psi, 350 bar discharge pressure - at system pressure range 0 to 5000 psi, 350 bar.	bar	34,5-44,8	34,5-44,8	34,5-44,8	34,5-44,8

*Note: Nominal setting, may be increased if required.

Series		Terms	P6	P7	P8	P11	P14	P24	P30
Controls									
Compensator response	off-stroke	sec.	0.05	0.05	0.05	0.07	0.07	0.10	0.10
(per SAE J497 @ **5000 psi**, 350 bar)	on-stroke	sec.	0.9	0.9	0.9	1.5	1.5	1.8	1.8
Compensator adjustment		**psi/turn**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
		bar/turn	138	138	138	138	138	138	138
Torque to turn rotary servo shaft		**in.-lbs**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
		Nm	2,3	2,3	2,3	2,3	2,3	2,3	2,3

The maximum inlet at the auxiliary pump inlet is 200 psi. (13,8 bar)

Minimum compensating pressure will always be 100-200 psi. (6,9-13,8 bar) over servo pressure.

Any inlet pressures above atmospheric will increase noise levels and decrease efficiencies noted in this literature. Exact measurements depend on each application and operating conditions. Please consult your nearest Parker Office for further details.

*Standard factory compensating pressure is 1,000 psi. (69,0 bar).

REAR DRIVE TORQUE CAPACITY

	FRONT INPUT SHAFT		REAR MOUNTINGS SAE						REAR OUTPUT SHAFT
SERIES	TYPE	TORQUE CAPACITY	A	B	C	D	E	F	TORQUE CAPACITY
P6,7,8	Keyed SAE 32-1(C)	**6920 in-lbs.**	●	●					**1750 in-lbs.**
P,S,V,X,D	Spline SAE 32-4(C)	(780 Nm)	●	●					(195 Nm)
P6,7,8	Keyed SAE 44-1(D)	**6920 in-lbs.**	●	●					**1750 in-lbs.**
P,S,V,X,D	Spline SAE 44-4(D)	(780 Nm)	●	●					(195 Nm)
P6,7,8	Keyed SAE 32-1(C)*	**13,845 in-lbs.**	●	●	●				**6920 in-lbs.**
R,L only	Spline SAE 32-4C	(1565 Nm)	●	●	●				(780 Nm)
P11,14	Keyed SAE 44-1(E)	**13,370 in-lbs.**	●	●	●				**2400 in-lbs.**
P,S,V,X	Spline SAE 44-4(E)	(1510 Nm)	●	●	●				(270 Nm)
P11,14	Keyed SAE 44-1(E)*	**26735 in-lbs.**	●	●	●	●	●		**13,370 in-lbs.**
R,L only	Spline SAE 44-4(E)	(3020 Nm)	●	●	●	●	●		(1510 Nm)
P24,30	Keyed SAE 50-1(F)	**24350 in-lbs.**		●	●				**2700 in-lbs.**
P,S,X	Spline SAE 50-4(F)	(2750 Nm)		●	●				(305 Nm)
P24,30	Keyed SAE 50-1(F)	**48,700* in-lbs.**		●	●	●	●	●	**24,350 in-lbs**
R,L only	Spline SAE 50-4(F)	**(5,500 Nm)**		●	●	●	●	●	(2750 Nm)

* Coupling for keyed shaft must be pressed fit for full torque capability.

P6/7/8 SAE 127-2 Mtg., 32-1, 4 Shaft Bearing 230-82140 (6007)

Speed (rpm)	1000	1000	1000	1000	1200	1200	1200	1200	1500	1500	1500	1500	1800	1800	1800	1800
Shaft Load (lbs) *	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000
Shaft Load (N) *	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448
Case Pressure (psi)	0	25	0	25	0	25	0	25	0	25	0	25	0	25	0	25
Case Pressure (bar)	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7
B-10 Life (hours x 1000)	**8E+08**	**1833**	**0.778**	**0.778**	**6E+08**	**1528**	**0.648**	**0.648**	**5E+08**	**1222**	**0.518**	**0.518**	**4E+08**	**1018**	**0.432**	**0.432**

P6/7/8 SAE 152-4 Mtg., 44-1, 4 Shaft Bearing 230-00207-0 (6207)

Speed (rpm)	1000	1000	1000	1000	1200	1200	1200	1200	1500	1500	1500	1500	1800	1800	1800	1800
Shaft Load (lbs) *	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000
Shaft Load (N) *	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448
Case Pressure (psi)	0	25	0	25	0	25	0	25	0	25	0	25	0	25	0	25
Case Pressure (bar)	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7
B-10 Life (hours x 1000)	**3E+09**	**7394**	**3.136**	**3.136**	**3E+09**	**6161**	**2.613**	**2.613**	**2E+09**	**4929**	**2.09**	**2.09**	**2E+09**	**4170**	**1.742**	**1.742**

P11/14 SAE 165-4 Mtg., 44-1, 4 Radial Shaft Bearing 230-82148-0 (6010) (2 & 3 Shaft Codes)

Speed (rpm)	1000	1000	1000	1000	1200	1200	1200	1200	1500	1500	1500	1500	1800	1800	1800	1800
Shaft Load (lbs) *	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000
Shaft Load (N) *	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448
Case Pressure (psi)	0	25	0	25	0	25	0	25	0	25	0	25	0	25	0	25
Case Pressure (bar)	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7
B-10 Life (hours x 1000)	**2E+09**	**535**	**1.907**	**1.907**	**2E+09**	**446**	**1.589**	**1.589**	**1E+09**	**356**	**1.272**	**1.272**	**1E+09**	**297**	**1.06**	**1.06**

P11/14 SAE 165-4 Mtg., 44-1, 4 Spherical Roller Shaft Bearing 230-82214-0 (22208) (7 & 8 Shaft Codes)

Speed (rpm)	1000	1000	1000	1000	1200	1200	1200	1200	1500	1500	1500	1500	1800	1800	1800	1800
Shaft Load (lbs) *	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000
Shaft Load (N) *	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448
Case Pressure (psi)	0	25	0	25	0	25	0	25	0	25	0	25	0	25	0	25
Case Pressure (bar)	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7
B-10 Life (hours x 1000)	**16856**	**2452**	**275**	**172**	**14046**	**2043**	**230**	**143**	**11237**	**1635**	**184**	**114.8**	**9364**	**1363**	**153**	**95.7**

P24 SAE 177-4 Mtg., 50-1, 4 Shaft Bearing 230-82213-0 (22311)

Speed (rpm)	1000	1000	1000	1000	1200	1200	1200	1200	1500	1500	1500	1500	1800	1800	1800	1800
Shaft Load (lbs) *	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000
Shaft Load (N) *	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448
Case Pressure (psi)	0	25	0	25	0	25	0	25	0	25	0	25	0	25	0	25
Case Pressure (bar)	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7
B-10 Life (hours x 1000)	**591.6**	**428.5**	**276.7**	**213.5**	**493**	**357**	**230.5**	**178**	**394.4**	**991.6**	**184.4**	**142.3**	**328.7**	**238**	**153.7**	**118.6**

P30 SAE 177-4 Mtg., 50-1, 4 Shaft Bearing 230-82213-0 (22311)

Speed (rpm)	1000	1000	1000	1000	1200	1200	1200	1200	1500	1500	1500	1500	1800	1800	1800	1800
Shaft Load (lbs) *	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000	0	0	1000	1000
Shaft Load (N) *	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448	0	0	4448	4448
Case Pressure (psi)	0	25	0	25	0	25	0	25	0	25	0	25	0	25	0	25
Case Pressure (bar)	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0	1.7
B-10 Life (hours x 1000)	**227**	**177.7**	**126.4**	**102.8**	**189.2**	**148**	**105.3**	**85.6**	**151.3**	**118.4**	**84.2**	**68.5**	**126.1**	**98.7**	**70.2**	**57.1**

*radial load at center of key or spline

Note: Variation in life is due to variations in tolerances within the pump.
Contact Parker Hydraulics for B-10 with other operating conditions and with other case pressure values.
Consult Parker Hydraulics for shaft side loads of P*R units.

Features

1 Quick change valve block - easy to service or replace

2 Quick change controls - easy to service and change

3 Dampened low inertia rocker cam - more stable, quieter and faster than other designs

4 Exclusive zero-backlash rotary servo design - lifetime accuracy

5 Field adjustable compensator override - easily adjusted without removing from machinery

6 Precision barrel bearing, a distinctive Denison Hydraulics feature for over 30 years - permits high speeds, high pressure and provides long life

7 Versatile controls - can be located on either side of pump or motor for maximum freedom of design

8 Ring style replenishing checks fastest operation with no sliding poppets or parts and low pressure drop

9 Hot oil shuttle available - fast, reliable operation

10 Auxiliary pump can be changed without disassembling the transmission

11 Standard SAE keyed or splined drive shafts are available

12 High pressure mechanical shaft seals can be changed without disassembling the transmission. Double lip seals are also available

13 One piece stroking vane/cam means no lost motion, zero backlash, better control, and no linkages to wear out

14 Stroking vane seals are pressure loaded for longer life

15 Standard compensator vent ports allow for a wide variety of controls (See Applications Manual)

16 Rocker cam displacement indicator helps troubleshoot the system

17 Modulated servo pressure saves power

18 Standard Code 62 SAE split flange connections

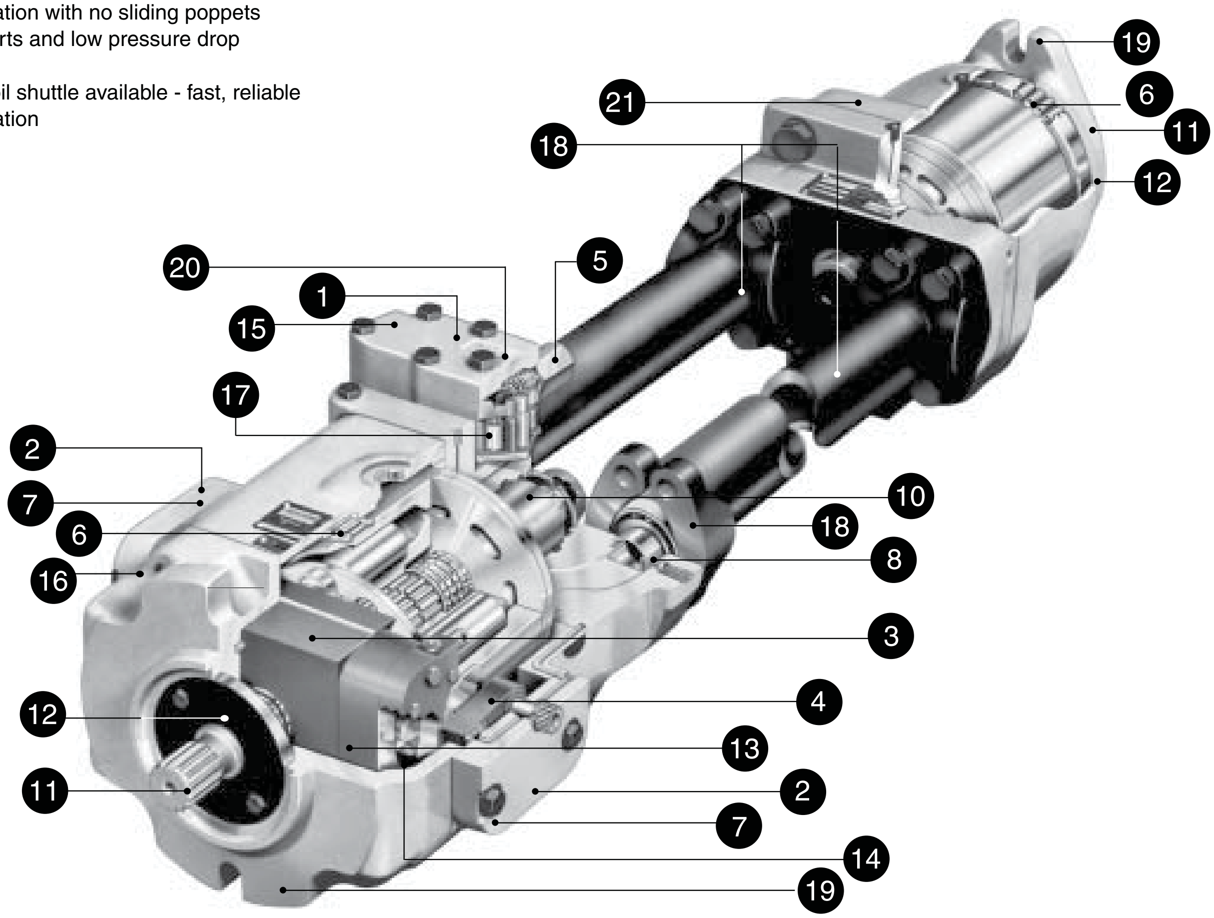
19 Conforms to SAE mounting standards.

20 Fast compensator response. See page 5

21 Variable motors available for multiple speed ranges or constant power

Note:

1. These products, with exception of 8 cubic inch units, are qualified to meet Military specifications MIL-P-17869A and MIL-S-901-C Grade A.
2. All GOLD CUP® Pumps and Motors* have ATEX approval.
   *See ordering code for availability.
3. Consult factory for other approvals such as ABS and Lloyd's Registry.



CLOSED HYDRAULIC CIRCUIT

Variable Pump/Fixed Motor. This combination provides for a constant torque output at a fixed maximum pressure over the full speed range. Speed and direction are controlled with a variable displacement over-center pump. Power from overhauling loads is regenerated back into the pump prime mover. Motor speed is limited to the maximum speed permitted by full pump displacement. System is capable of full power only at maximum pump displacement.

POWER CHARACTERISTICS OF HYDROSTATIC TRANSMISSIONS

Variable Pump/Variable Motor. This combination provides for an extended range of motor speeds. The motor, at full displacement, delivers maximum torque while its speed and direction respond to displacement changes of the crossover center pump. Power is proportional to motor speed.

This transmission system has the capability of constant torque and rising power until the pump reaches full displacement and full power at elevated speeds as motor displacement and torque are reduced.

PACKAGE PUMP

The package pump contains the circuit elements shown in the hydraulic schematic on pgs. 72-74. These include the axial piston over-center variable displacement pump which controls the speed and direction of the motor, the auxiliary pump which supplies servo pressure (for controlling the displacement of the variable pump) and replenishment pressure, the servo pressure relief valve, the replenishment pressure relief valve and the replenishment check valves for ports A and B. The pump package also includes the displacement control valves as well as an external arm which shows actual displacement. The various control features are described below.

PACKAGE MOTOR

The package motor, shown in schematic pgs. 72-74, contains the axial piston fluid motor, the shuttle valve that continuously removes hot oil from the low pressure side of the loop and a relief valve to establish minimum hydraulic loop pressure at the motor. The fluid motor is available with fixed displacement or with the variable displacement option. The standard variable motors include an external indicator which shows displacement.

OPEN CIRCUIT PUMP

The open circuit pump contains the circuit elements shown on pages 75,76. These include a cross-center variable displacement pump which is normally limited to one side of center. The auxiliary pump supplies only servo pressure to control the main pump displacement and inlet porting is enlarged to improve the pump's inlet characteristics. As the open loop pump operates on one side of center only, not all controls are available.

AUXILIARY REAR DRIVE

Additional auxiliary flow is available with the rear drive pump option. The rear drive may also be utilized for servo and other purposes. See ordering code for additional detail.

"R" & "L" style pumps have no rear shaft seal, so any pump driven must be able to withstand case pressure of the pump driving it.

AUXILIARY PUMP

Integral to the package pump's envelope is the gerotor auxiliary pump. (P24P, P24S, P30P & P30S have vane integral pump). It provides servo and replenishing pressure. See page 5 for factory settings.
NOTE: Auxiliary pump inlet must be connected directly to the reservoir. Customer must supply external line from integral auxiliary pump back into main pump for filtering servo and/or replenishing oil.
(see installation drawings starting on pg 10.)

MOUNTING

The pump or motor is designed to operate in any position. For vertical mounting it is recommended that the shaft bearing be drained via the drain port provided. The mounting hub and mounting flange are in full conformance with SAE standard. The shaft must be in alignment with the shaft of the driven load and should be checked with a dial indicator. The mounting pad or adapter into which the fluid pump pilots must be concentric with the pump shaft within 0.006 in., 0,152 mm to prevent bearing failure. This concentricity is particularly important if the shaft is rigidly connected to the driving load without a flexible coupling. The shaft-coupling interface must be lubricated with lithium molydisulfide or similar grease.

INLET PRESSURES, PORTS A & B

In a closed hydraulic loop the pump inlet or the fluid motor inlet (during dynamic braking) are supercharged by the integral replenishment system. Consult Parker in cases where fluid viscosity or dynamics or line size may cause inlet pressure at either port A or B to be less than the 150 psi, 10,3 bar maintained by the integral replenishment system. For operation in open loop or combination open-closed loops, consult Parker.

DRAIN PORT

Drain the package pump from the higher drain port. If drain port is above the fluid level in the tank install a 5 psi, 0,3 bar relief of suitable size in the drain line to tank. For vertical mounting it is recommended that the shaft bearing be drained via the drain port provided.

For pump speeds intermittently below 1000 rpm, install a back pressure relief 40 psi, 2,8 bar of suitable size in the drain line from the higher port to tank. Motor case drain must be connected to pump case.

Motor: Drain the motor from the higher drain ports into the lower pump drain port or tank. Make provision that the motor drain port pressure will not exceed the maximum limits specified above.

RETURN LINE FILTER

Relatively inexpensive low pressure filters are recommended for installation in the return lines and drain lines from circuits using these pumps or motors. Consider the possibility of decompression surges and intensified flow in cylinder circuits as well as the factors above in selecting return line filters.

AUXILIARY FLOW FILTERS

It is recommended the auxiliary pump fluid be filtered to aid in maintaining acceptable cleanliness levels. For good filtration and reasonable maintenance intervals the filter capacity must be at least twice the auxiliary pump flow. To use this feature, install the isolation plug and connect the filter between ports G&H, (P6,P7,P8,P24,P30), or J&K (P11,P14). See detailed schematics and drawings pages 10-22 for location of these ports.

RECOMMENDED FLUIDS

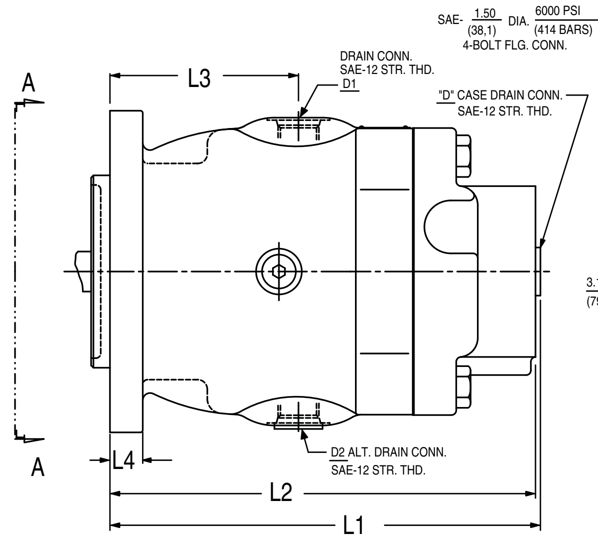
The fluid recommended for use in these pumps and motors has a petroleum base and contains agents which provide oxidation inhibition and anti-rust, antifoam and de-areating properties as described in Parker Denison standard HF-1. These preferred fluids do not contain anti-wear additives. Fluids containing anti-wear additives that meet Parker Denison standard HF-0 are acceptable.

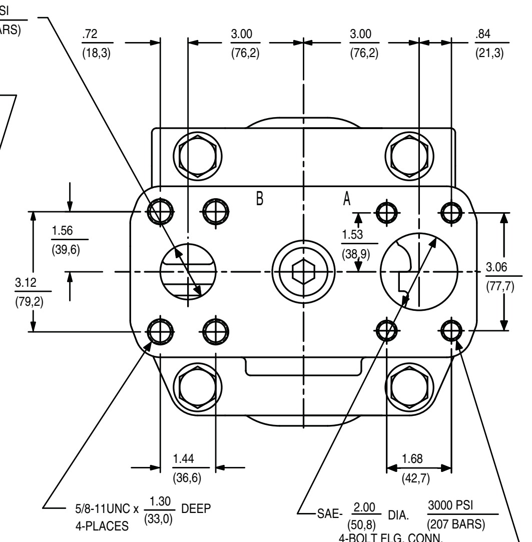
VISCOSITY

Max. at cold start 7500 SUS, 1600 cSt
at low pressure, low flow and if possible, low speed
Max. at full power 750 SUS, 160 cSt
Optimum for max. life 140 SUS, 30 cSt
Minimum at full power 60 SUS, 10cSt

CLEANLINESS

Particle contamination to meet ISO 20/17/14 or better. Water content < 500 ppm for mineral based fluids. For detail on fluid recommendations see bulletin SPO-AM305.

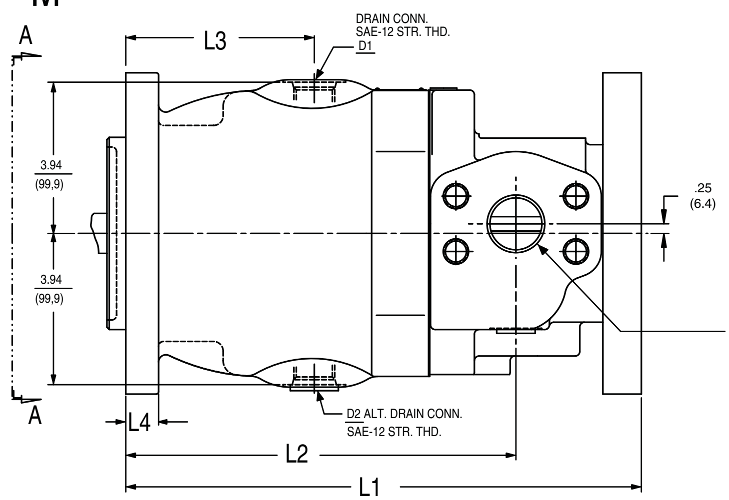


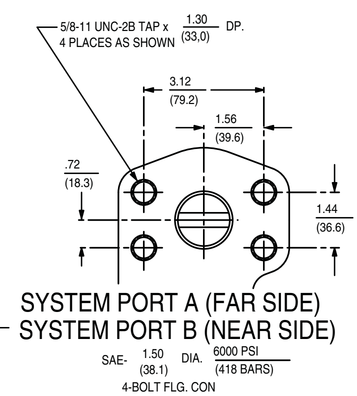


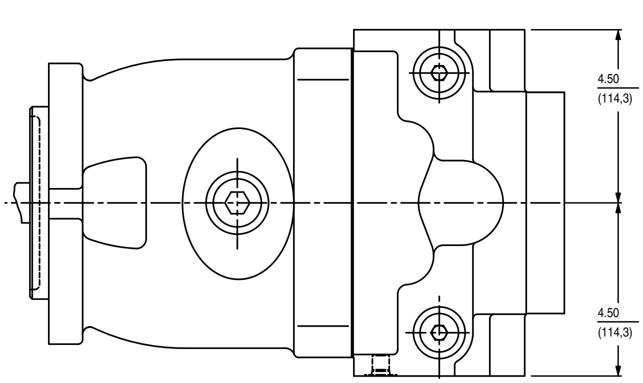
P*F

MOUNTING	L1	L2	L3	L4
SAE 127-2 (SAE-C)	11.19 (284,2)	11.06 (280,9)	4.90 (124,5)	.85 (21,6)
SAE 152-4 (SAE-D)	11.59 (294,3)	11.46 (291,1)	5.30 (134,6)	.89 (22,6)

P*M

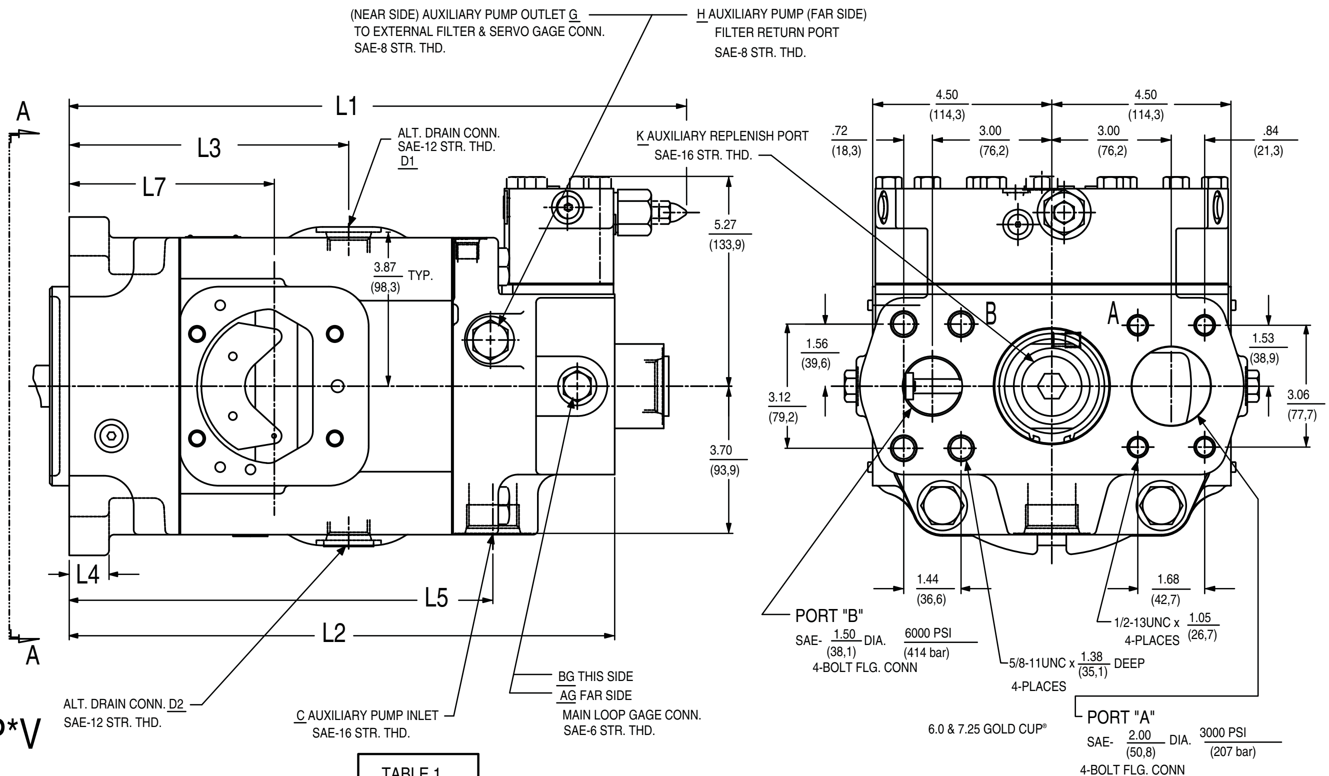






MOUNTING	L1	L2	L3	L4
SAE 127-2 (SAE-C)	13.40 (340,4)	10.14 (257,6)	4.90 (124,5)	.85 (21,6)
SAE 152-4 (SAE-D)	13.80 (350,5)	10.54 (267,7)	5.30 (134,6)	.89 (22,6)

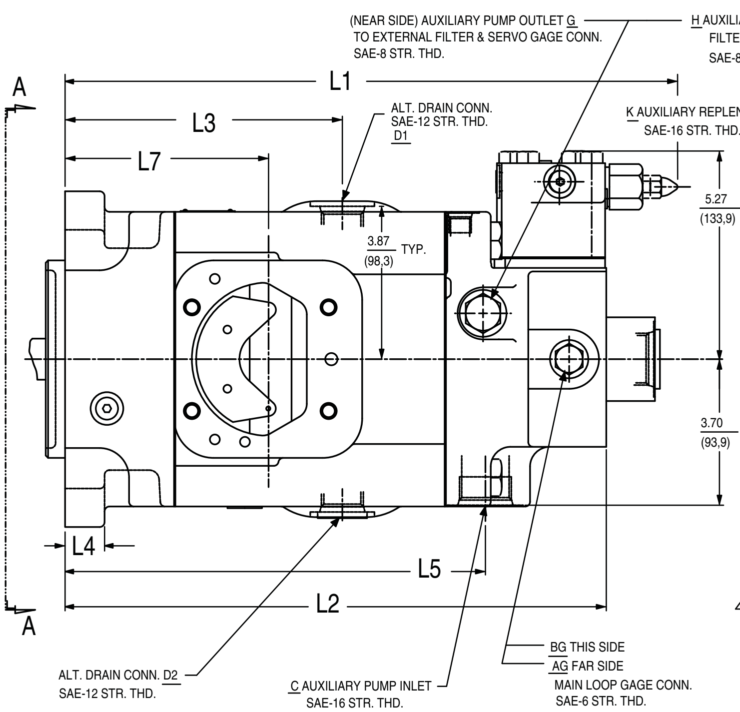
NOTE: See page 16 for shaft information.
See pages 45-54 for rear drive information.

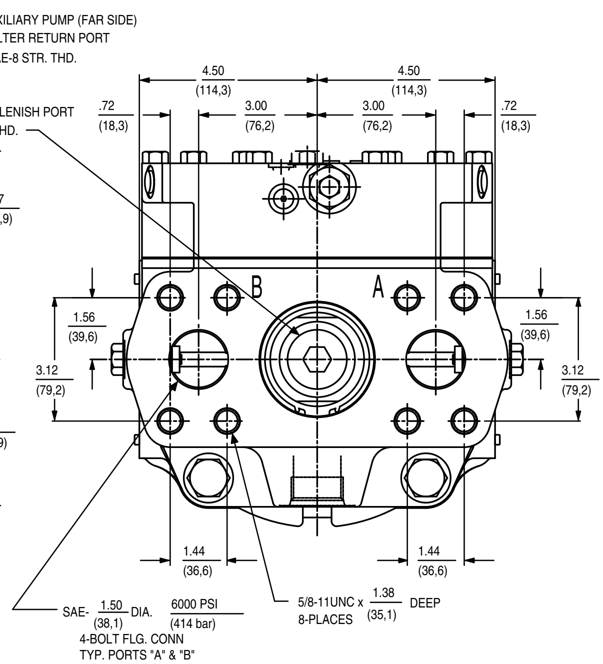


P*V

TABLE 1						
MOUNTING	L1	L2	L3	L4	L5	L7
SAE 127-2 (SAE-C)	15.51 (393,9)	13.70 (348,0)	7.02 (178,3)	1.00 (25,4)	10.64 (270,3)	5.15 (130,9)
SAE 152-4 (SAE-D)	16.85 (427,9)	15.04 (382,1)	8.36 (212,3)	.86 (21,8)	11.98 (304,3)	6.49 (164,8)

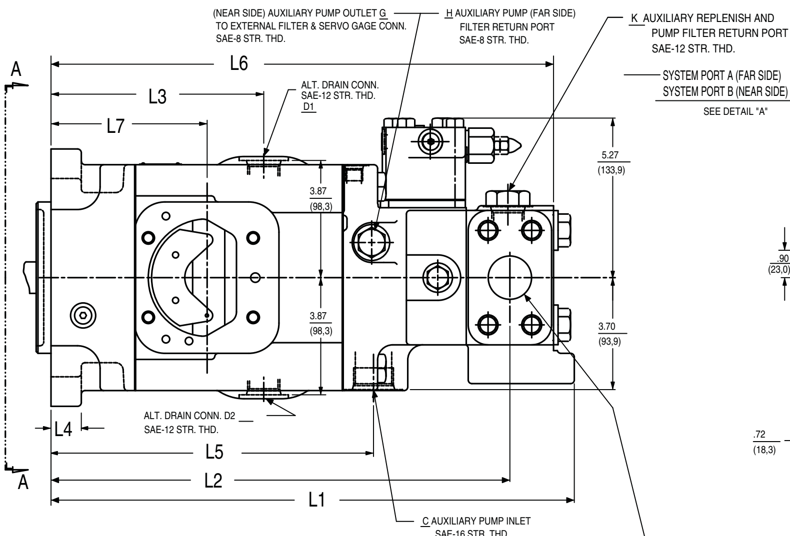
P*D & P*P





NOTE: See page 16 for shaft information.
See appropriate controls mounting starting on page 34.

P*X



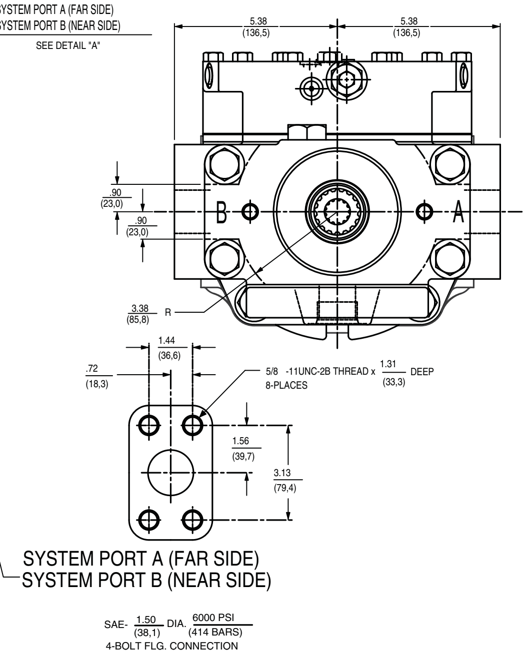
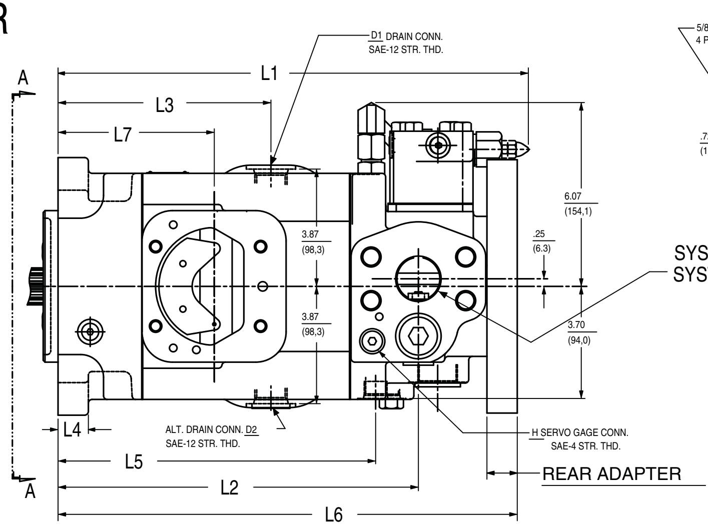
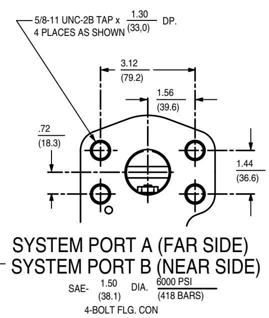


TABLE 3

MOUNTING	L1	L2	L3	L4	L5	L6	L7
SAE 127-2 (SAE-C)	17.27 (438,6)	15.14 (384,6)	7.02 (178,3)	1.00 (25,4)	10.64 (270,3)	16.58 (421,2)	5.15 (130,9)
SAE 152-4 (SAE-D)	18.61 (472,6)	16.48 (418,6)	8.36 (212,3)	.86 (21,8)	11.98 (304,3)	17.92 (455,2)	6.49 (164,8)

P*R





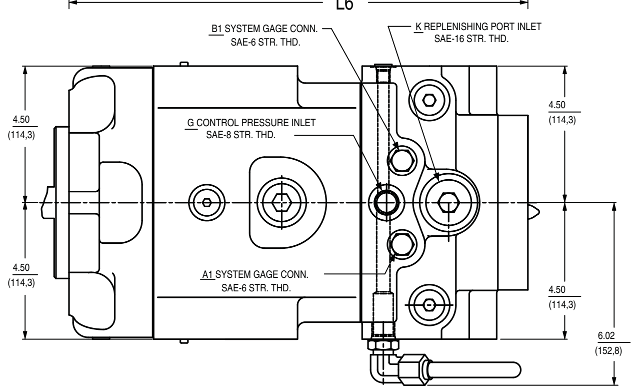
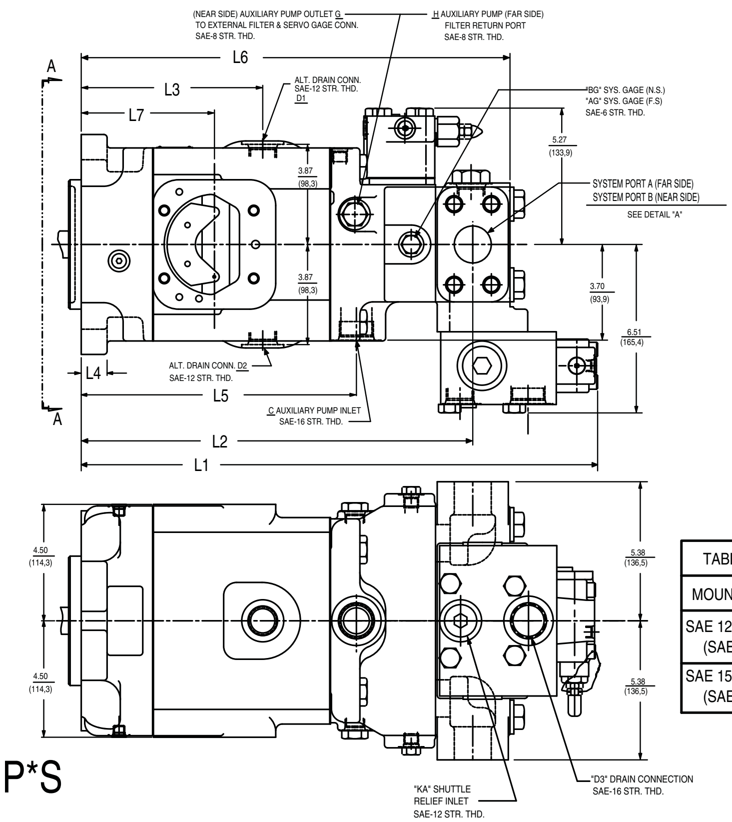
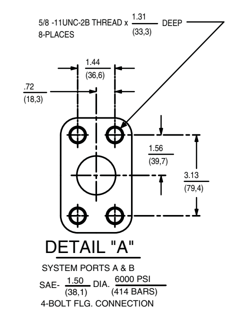


TABLE 2

MOUNTING	L1	L2	L3	L4	L5	L6	L7
SAE 127-2 (SAE-C)	15.51 (393,9)	11.88 (301,8)	7.02 (178,3)	1.00 (25,4)	10.64 (270,3)	15.14 (384,6)	5.15 (130,9)
SAE 152-4 (SAE-D)	16.85 (427,9)	13.22 (335,9)	8.36 (212,3)	.86 (21,8)	11.98 (304,3)	16.48 (418,7)	6.49 (164,8)

NOTE: See page 16 for shaft information.
See pages 45-54 for rear drive information.
See appropriate controls mounting starting on page 34.





P*S

TABLE 5							
MOUNTING	L1	L2	L3	L4	L5	L6	L7
SAE 127-2 (SAE-C)	19.97 (507,3)	15.14 (384,6)	7.02 (178,3)	1.00 (25,4)	10.64 (270,3)	16.58 (421,2)	5.15 (130,9)
SAE 152-4 (SAE-D)	21.31 (541,3)	16.48 (418,6)	8.36 (212,3)	.86 (21,8)	11.98 (304,3)	17.92 (455,2)	6.49 (164,8)

P*L

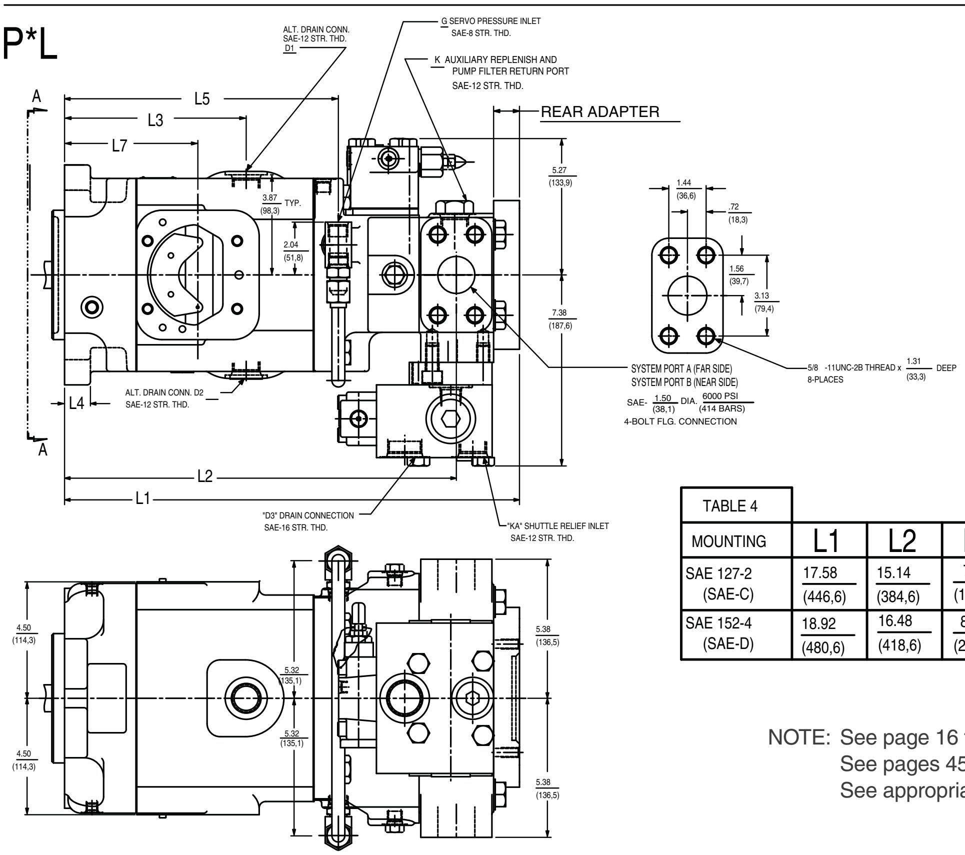
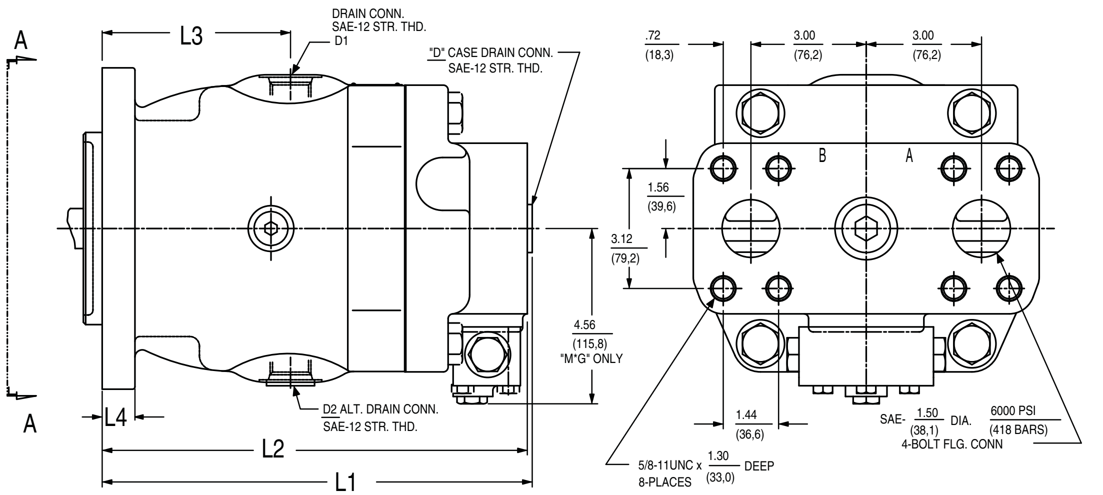


TABLE 4							
MOUNTING	L1	L2	L3	L4	L5	L6	L7
SAE 127-2 (SAE-C)	17.58 (446,6)	15.14 (384,6)	7.02 (178,3)	1.00 (25,4)	10.58 (268,8)	16.58 (421,2)	5.15 (130,9)
SAE 152-4 (SAE-D)	18.92 (480,6)	16.48 (418,6)	8.36 (212,3)	.86 (21,8)	11.92 (302,8)	17.92 (455,2)	6.49 (164,8)

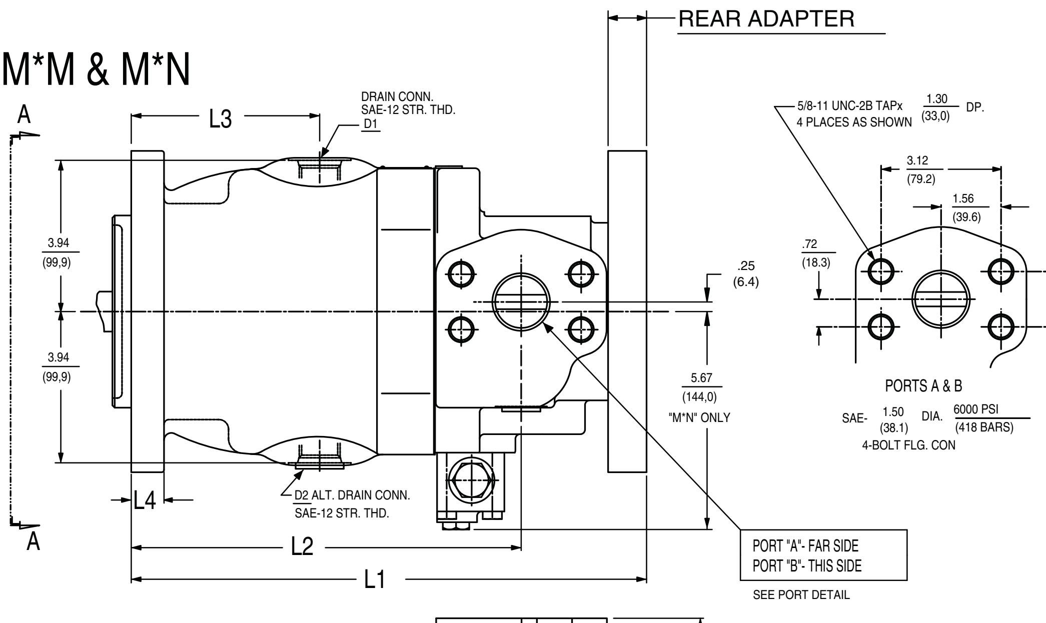
NOTE: See page 16 for shaft information.
See pages 45-54 for rear drive information.
See appropriate controls mounting starting on page 34.

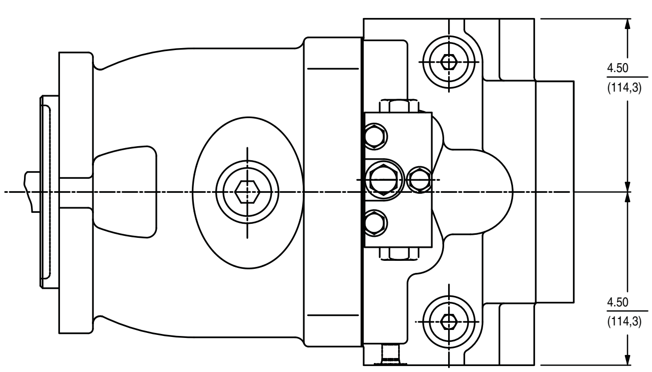
M*F & M*G

MOUNTING	L1	L2	L3	L4
SAE 127-2 (SAE-C)	11.19 (284,2)	11.06 (280,9)	4.90 (124,5)	.85 (21,6)
SAE 152-4 (SAE-D)	11.59 (294,3)	11.46 (291,1)	5.30 (134,6)	.89 (22,6)



M*M & M*N





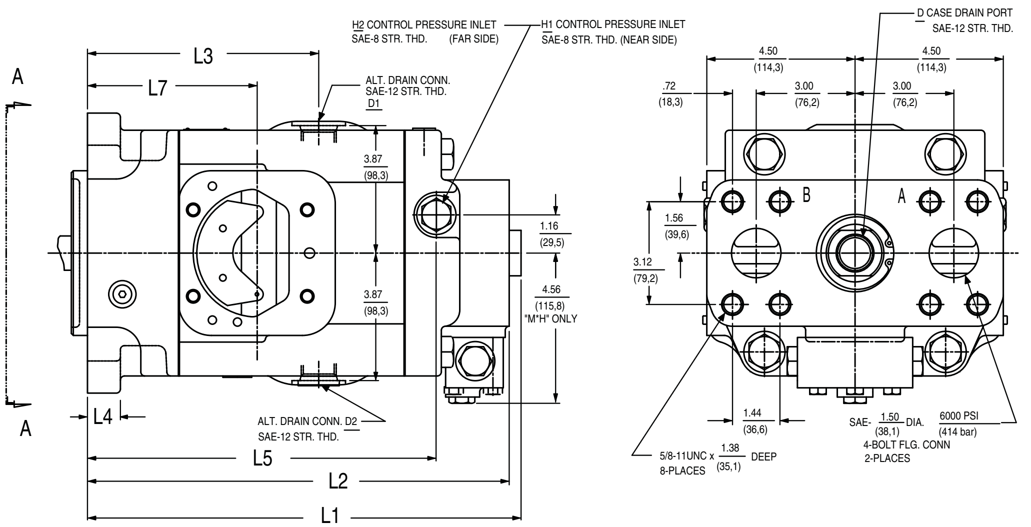
MOUNTING	L1	L2	L3	L4
SAE 127-2 (SAE-C)	13.40 (340,4)	10.14 (257,6)	4.90 (124,5)	.85 (21,6)
SAE 152-4 (SAE-D)	13.80 (350,5)	10.54 (267,7)	5.30 (134,6)	.89 (22,6)

NOTE: See page 16 for shaft information.
See pages 45-54 for rear drive information.

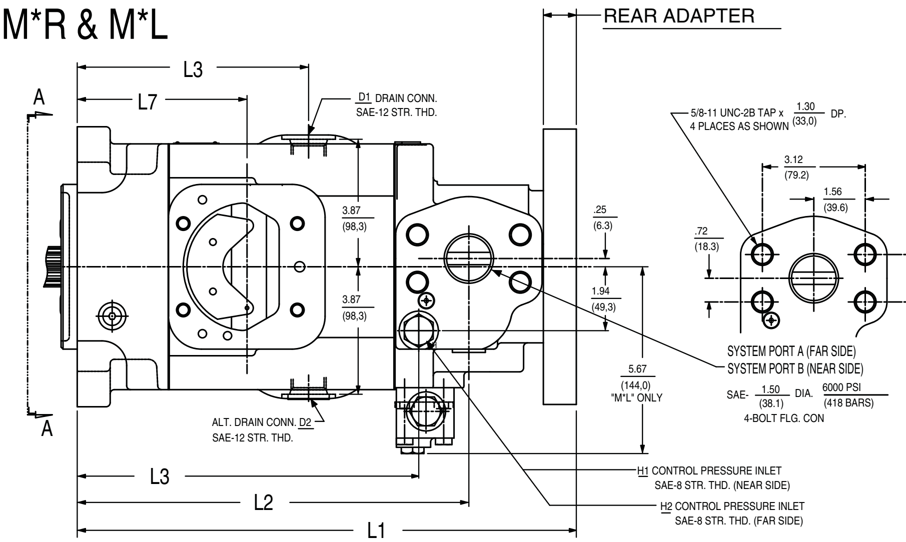
M*H & M*V

TABLE 14

MOUNTING	L1	L2	L3	L4	L5	L7
SAE 127-2 (SAE-C)	13.16 (334,3)	12.80 (325,1)	7.02 (178,3)	1.00 (25,4)	10.58 (268,8)	5.15 (130,9)
SAE 152-4 (SAE-D)	14.50 (368,3)	14.14 (359,2)	8.36 (212,3)	.86 (21,8)	11.92 (302,8)	6.49 (164,8)



M*R & M*L



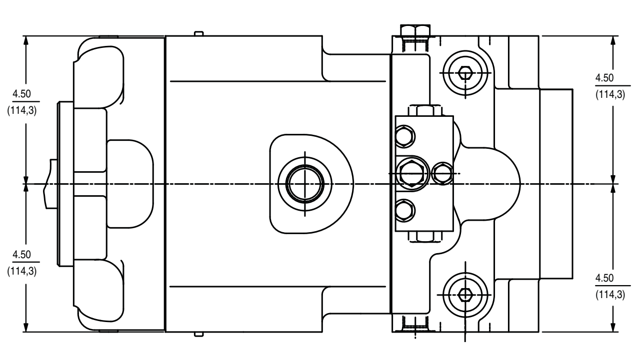
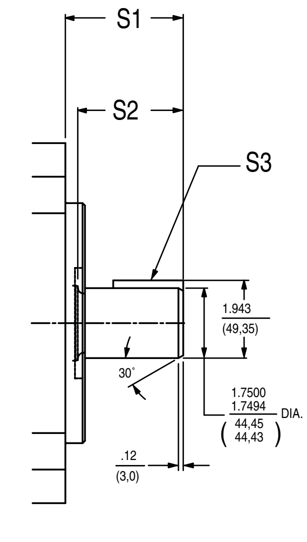


TABLE 13

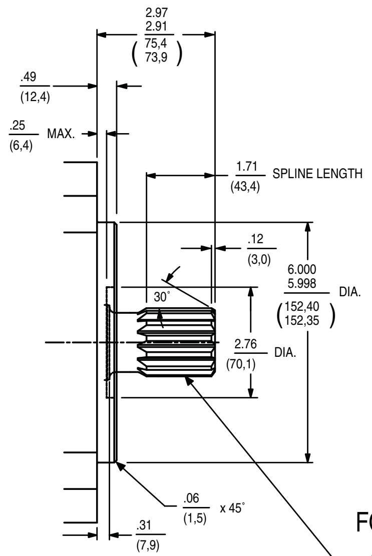
MOUNTING	L1	L2	L3	L4	L5	L7
SAE 127-2 (SAE-C)	15.14 (384,6)	11.88 (301,8)	7.02 (178,3)	1.00 (25,4)	10.36 (263,1)	5.15 (130,9)
SAE 152-4 (SAE-D)	16.48 (418,7)	13.22 (335,9)	8.36 (212,3)	.86 (21,8)	11.70 (397,2)	6.49 (164,8)

NOTE: See page 16 for shaft information.
See pages 45-54 for rear drive information.
See appropriate controls mounting starting on page 34.

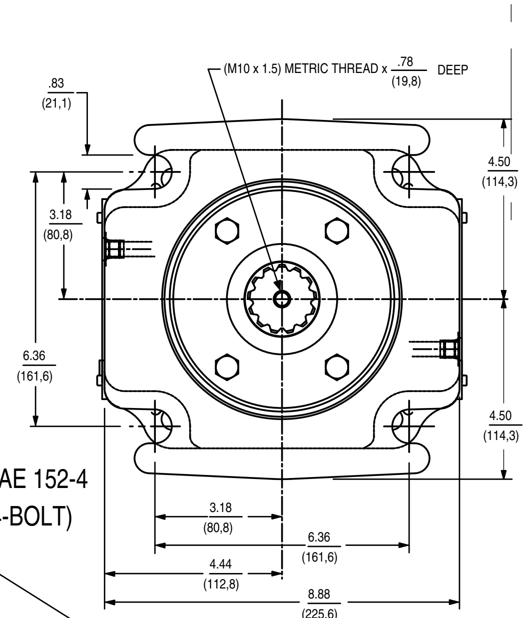
M*F, M*G, M*H, M*V, P*S, P*X, P*D, P*P, P*V & P*F M*R, M*L, M*M, M*N, P*L & P*R



SAE 152-4 ("D" 4 BOLT)
SAE 44-1
("D" KEYED)



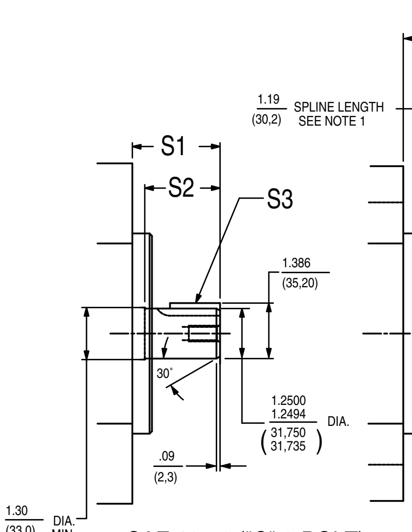
SAE 152-4 ("D" 4 BOLT)
SAE 44-4
("D" SPLINE)



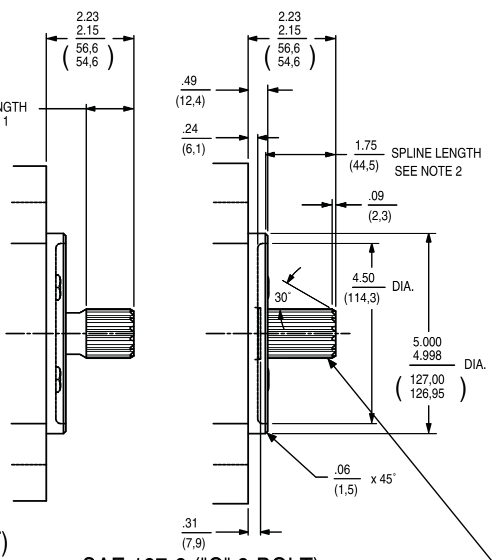
FOR SAE 152-4
("D" 4-BOLT)

SHAFT DEGIGNATION PUMP MODEL CODE	SHAFT	S1	S2	S3
04	SAE 44-1 (SAE-D Key)	2.97/2.91 (75,4/73,9)	2.64 (67,0)	.438/.437 (11,12/11,10) SQ. KEY x 1.75 (44,4)

SHAFT DEGIGNATION PUMP MODEL CODE	
05	SAE INVOLUTE SPLINE J498-B 1969 EXTERNAL CLASS 1 FLAT ROOT SIDE FIT 8/16 DIA. PITCH 30˚ PRESSURE ANGLE 13 TEETH 1.7210-1.7160 (43,713/43,586) MAJOR DIA

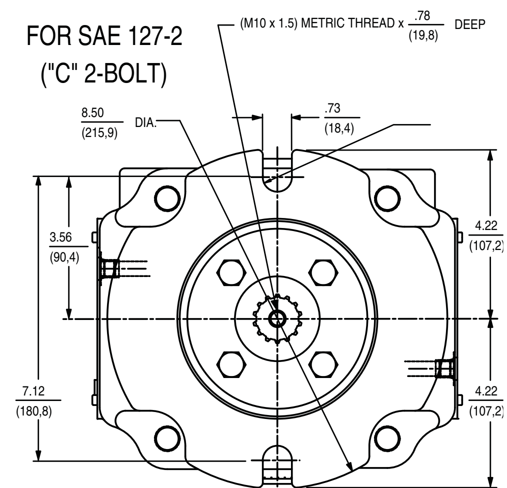


SAE 127-2 ("C" 2-BOLT)
SAE 32-1
("C" KEYED)



SAE 127-2 ("C" 2-BOLT)
SAE 32-4
("C" SPLINE)

FOR SAE 127-2
("C" 2-BOLT)

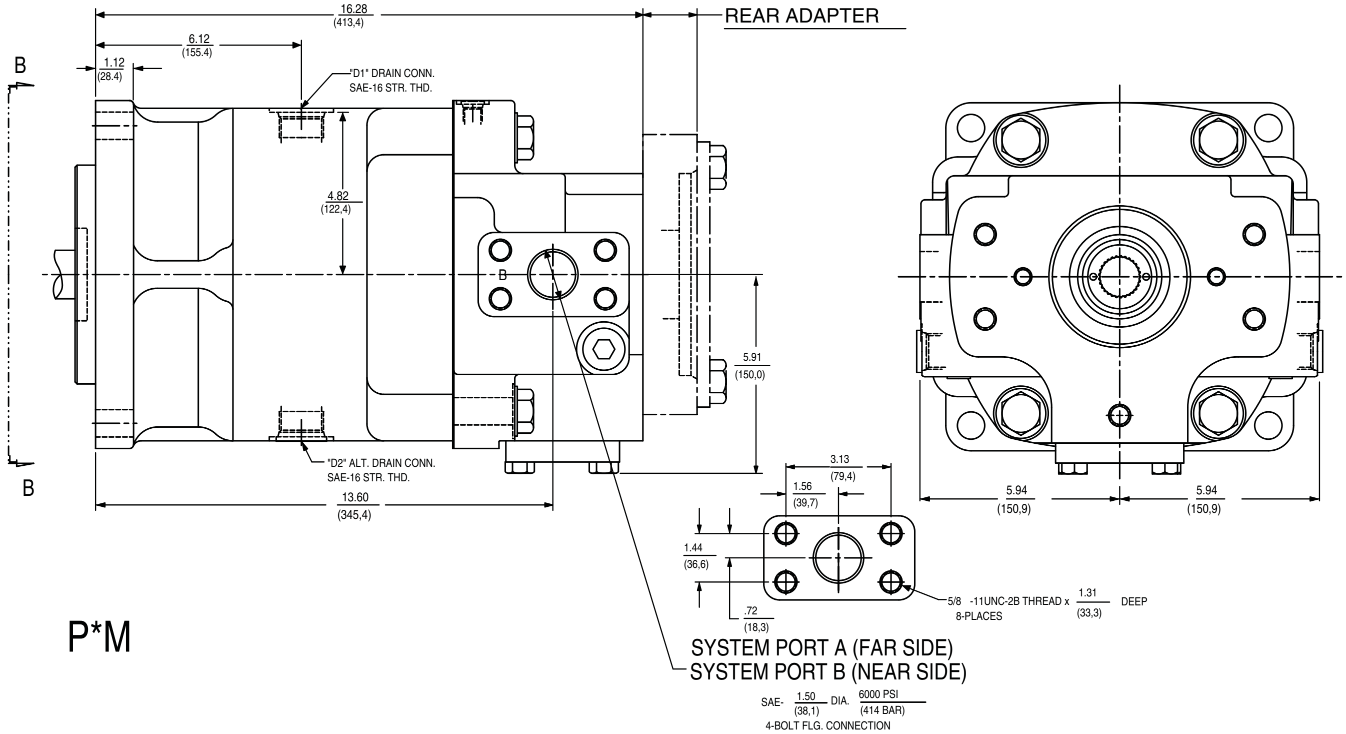


NOTES:
1. SPLINE LENGTH ONLY FOR:
M*F, M*G, M*H, M*V, P*S, P*X, P*D, P*P, P*V & P*F
2. SPLINE LENGTH ONLY FOR:
M*R, M*L, M*M, M*N, P*L & P*R

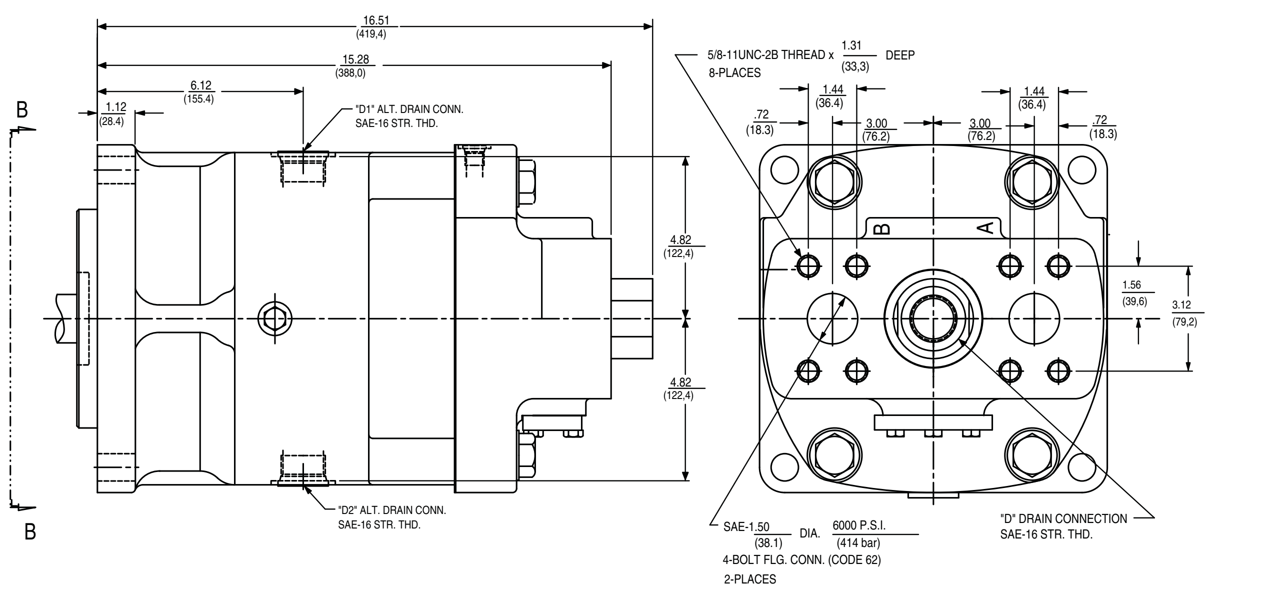
SHAFT DEGIGNATION PUMP MODEL CODE	SHAFT	S1	S2	S3
02 or 07	SAE 32-1 (SAE-C)	2.23/2.15 (56,6/54,6)	1.88 (47,8)	.312/.310 (7,92/7,87) SQ. KEY x LG. 1.25/1.22 (31,8/31,0)
09 or 10	SAE 32-1 LONG (SAE-C)	3.36/3.28 (85,3/83,3)	3.01 (76,4)	.312/.310 (7,92/7,87) SQ. KEY x LG. 2.38/2.35 (60,4/59,7)

SHAFT DEGIGNATION PUMP MODEL CODE	
03 or 08	SAE INVOLUTE SPLINE J498-B 1969 EXTERNAL CLASS 1 FLAT ROOT SIDE FIT 12/24 DIA. PITCH 30˚ PRESSURE ANGLE 14 TEETH 1.2293-1.2243 (31,224/31,097) MAJOR DIA

P*M



P*F



NOTE: See page 23 for shaft information.
See pages 45-54 for rear drive information.

P*P

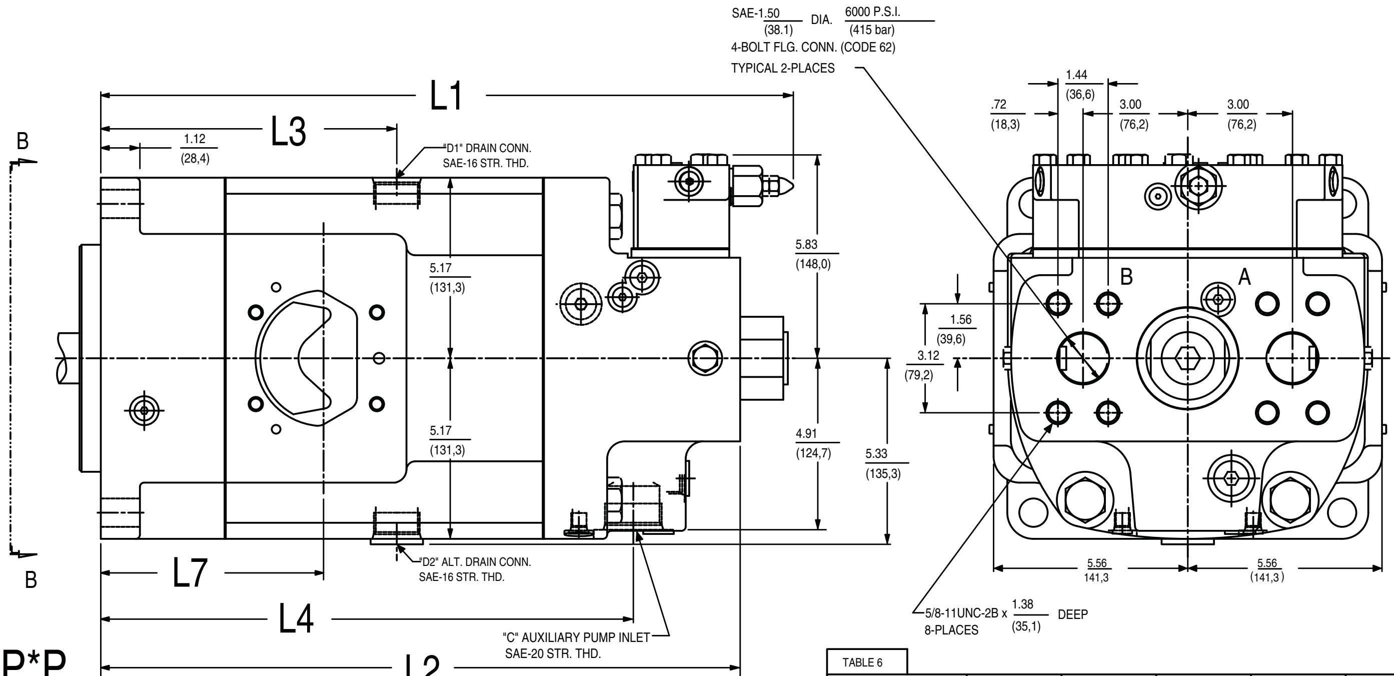
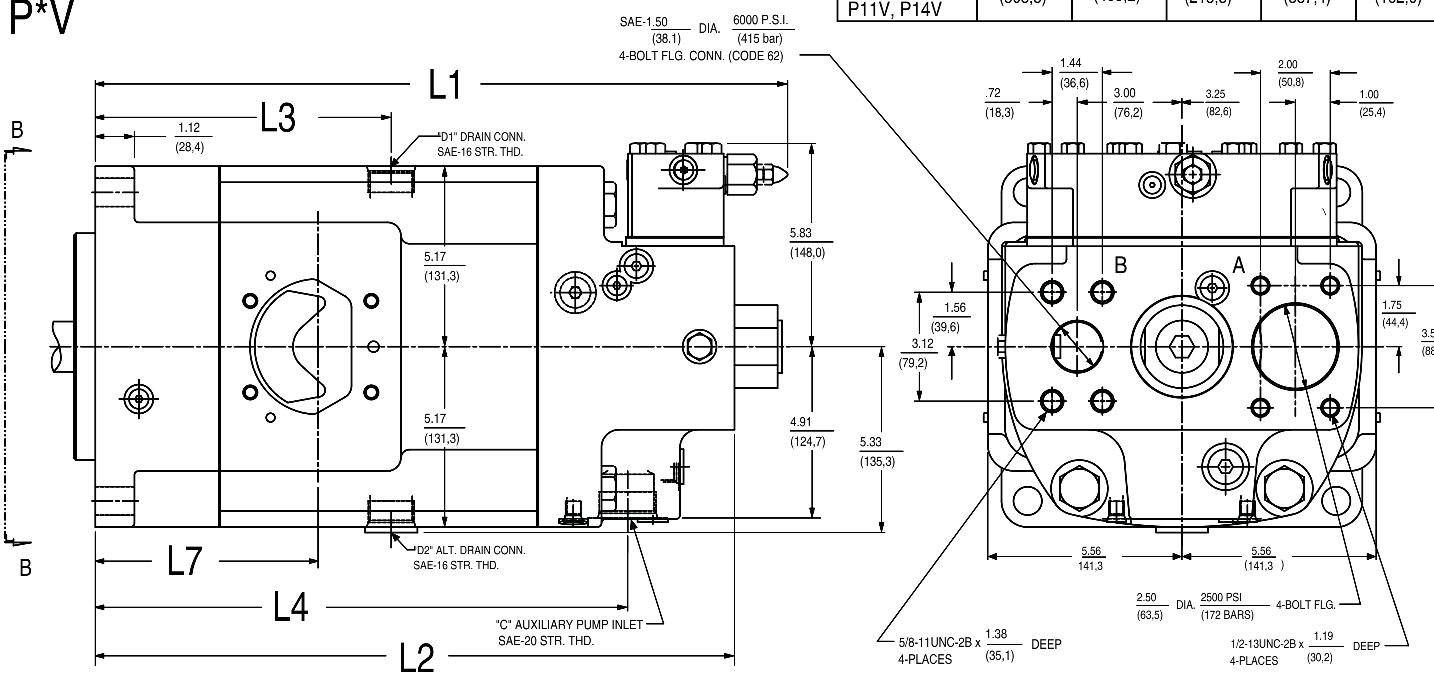


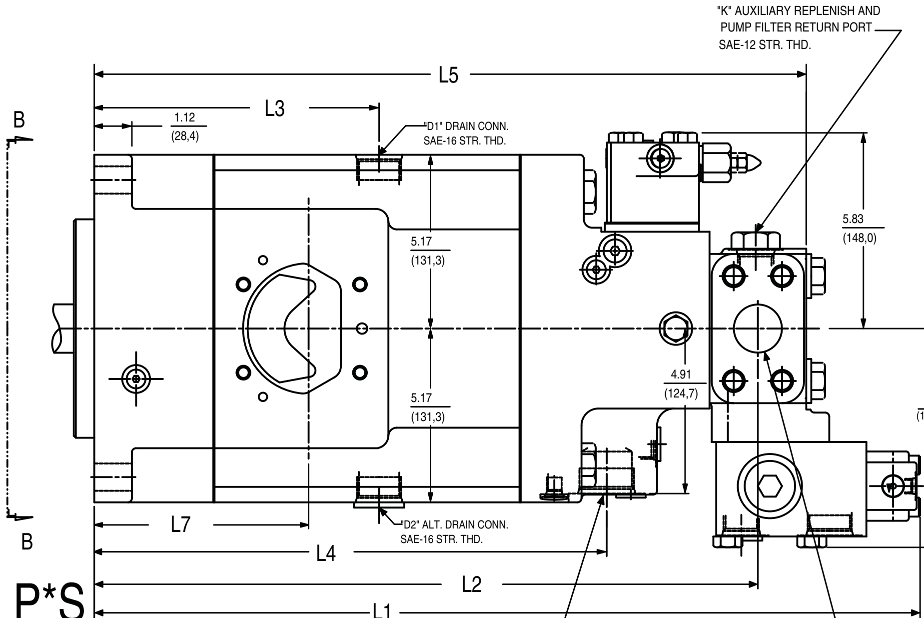
TABLE 6

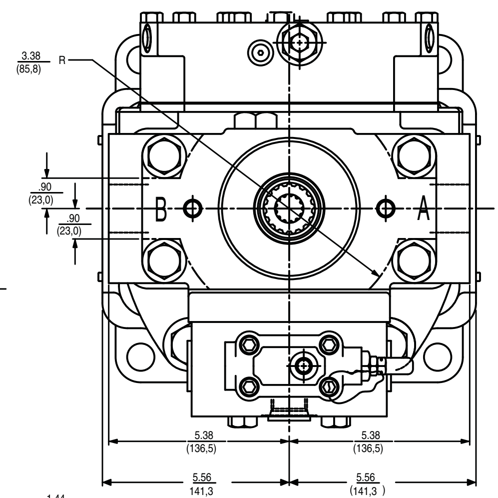
PUMP	L1	L2	L3	L4	L7
P11P, P14P & P11V, P14V	19.83 (503,8)	18.31 (465,2)	8.48 (215,3)	15.25 (387,4)	6.38 (162,0)

P*V



NOTE: See page 23 for shaft information.
See appropriate controls mounting starting on page 34.

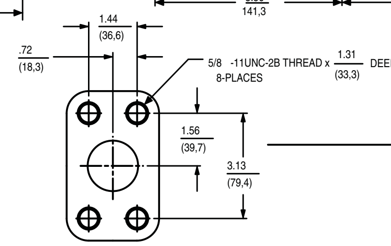




P*S

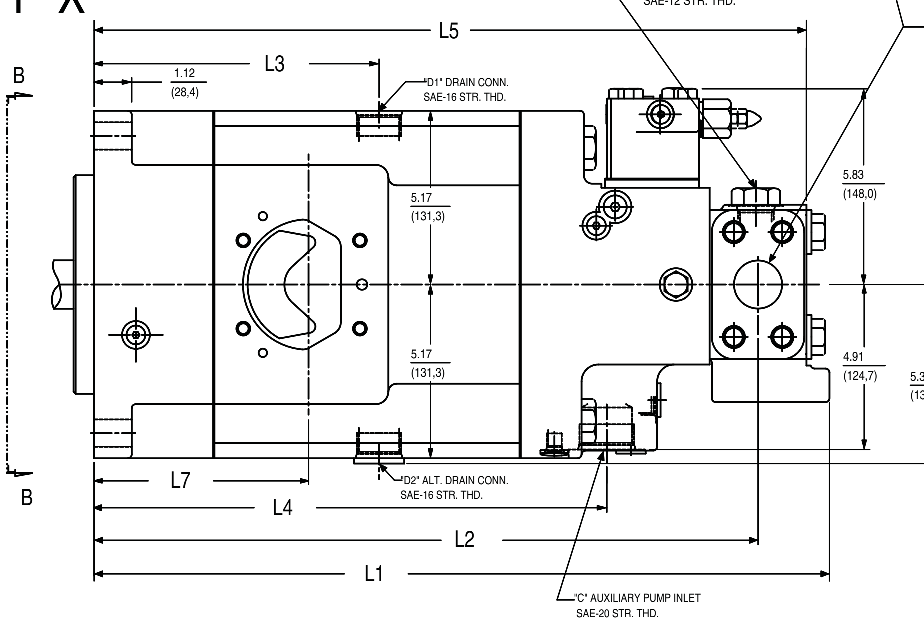
"C" AUXILIARY PUMP INLET
SAE-20 STR. THD.

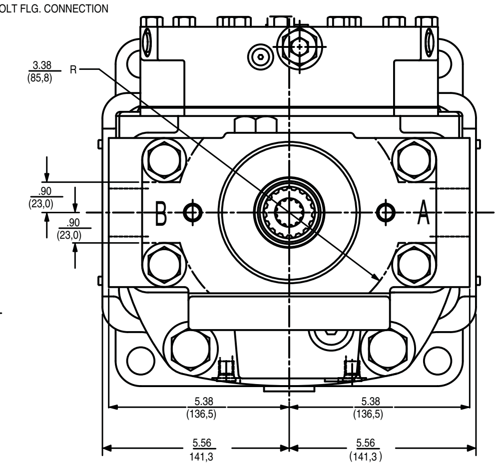
TABLE 7						
PUMP	L1	L2	L3	L4	L5	L7
P*S	24.58 (624,4)	19.75 (501,7)	8.48 (215,3)	15.25 (387,4)	21.19 (538.3)	6.38 (162,0)
P*X	21.88 (555,7)					



SYSTEM PORT A (FAR SIDE)
SYSTEM PORT B (NEAR SIDE)
SAE- 1.50 (38,1) DIA. 6000 PSI (414 BARS)
4-BOLT FLG. CONNECTION

P*X

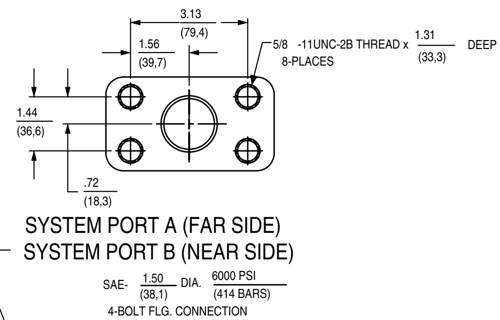


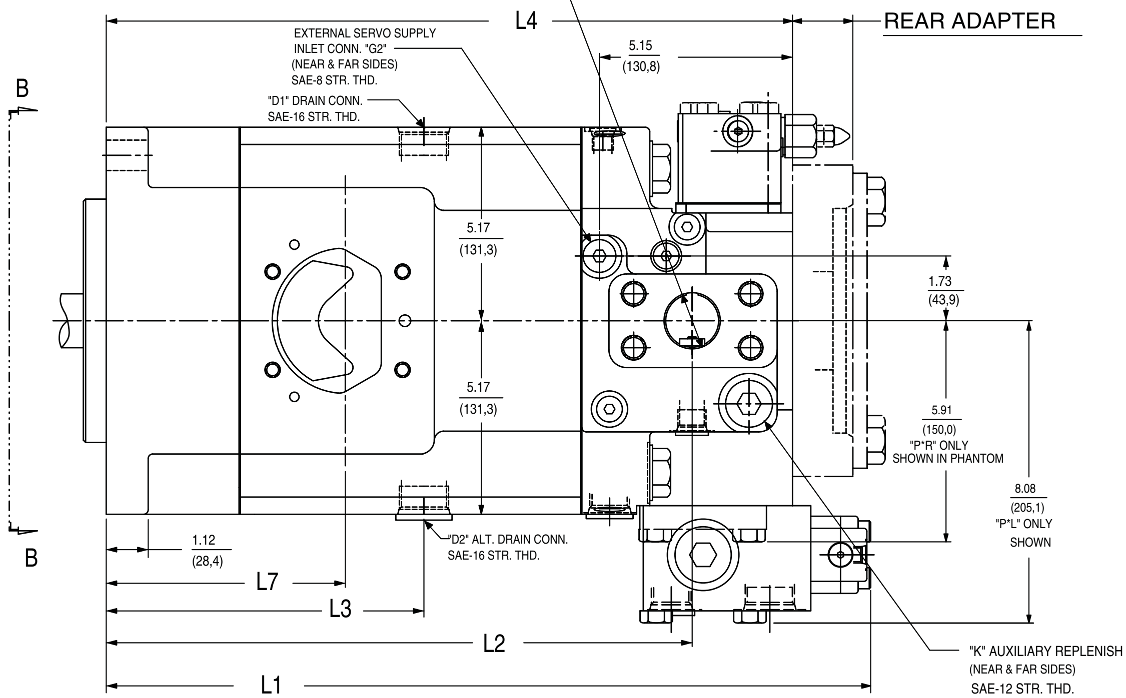


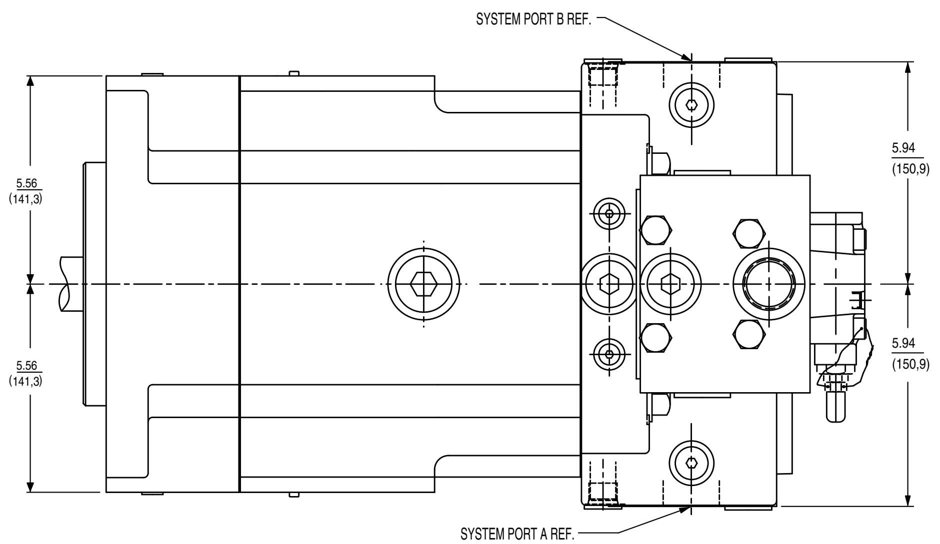
NOTE: See page 23 for shaft information.
See pages 45-53 for rear drive information.
See appropriate controls mounting starting on page 34.

P*R & P*L

TABLE 8					
PUMP	L1	L2	L3	L4	L7
P*R & P*L	18.31 (465,2)	15.64 (397,1)	8.48 (215,3)	18.31 (465,2)	6.38 (162,0)

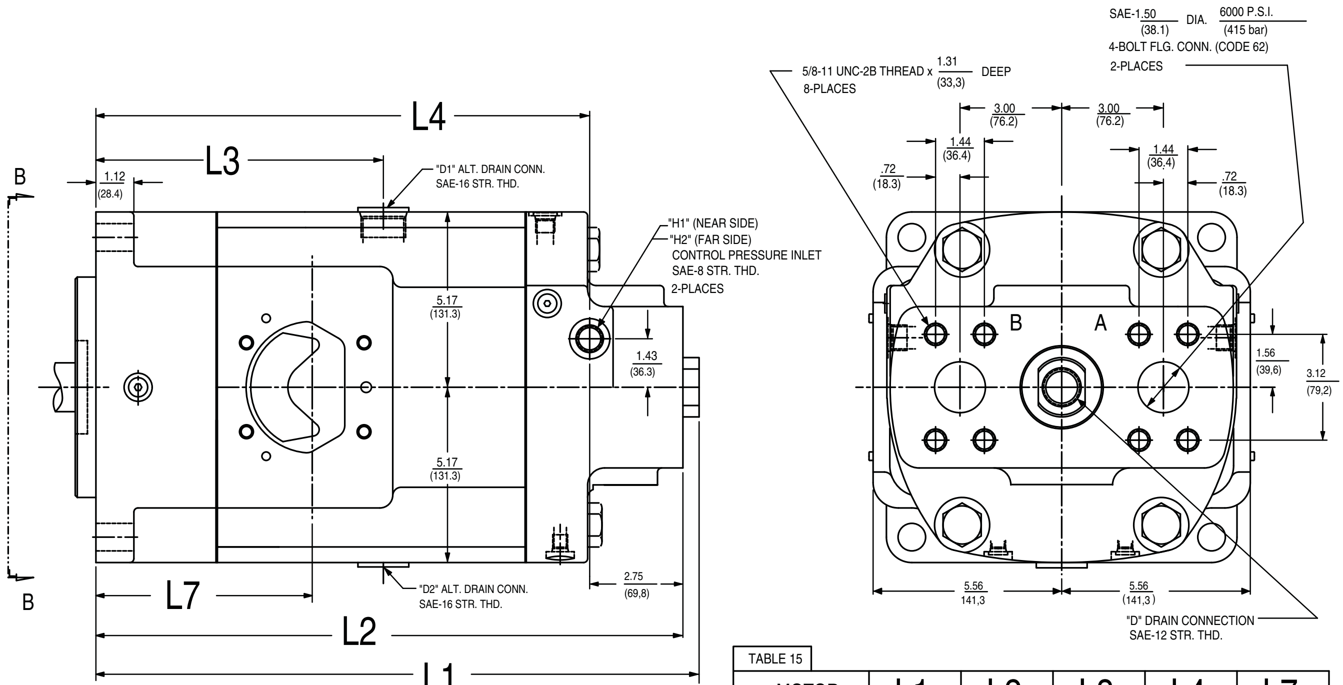






NOTE: See page 23 for shaft information.
See pages 45-53 for rear drive information.
See appropriate controls mounting starting on page 34.

11-14 MOTOR DIMENSIONS

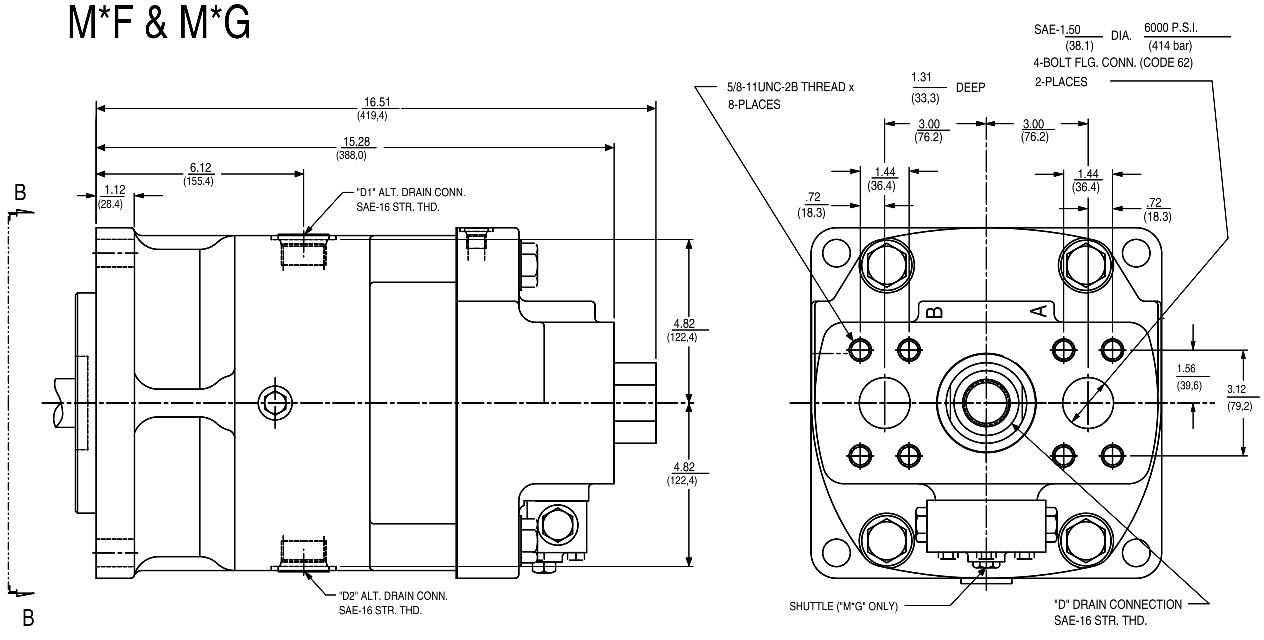


M*H & M*V

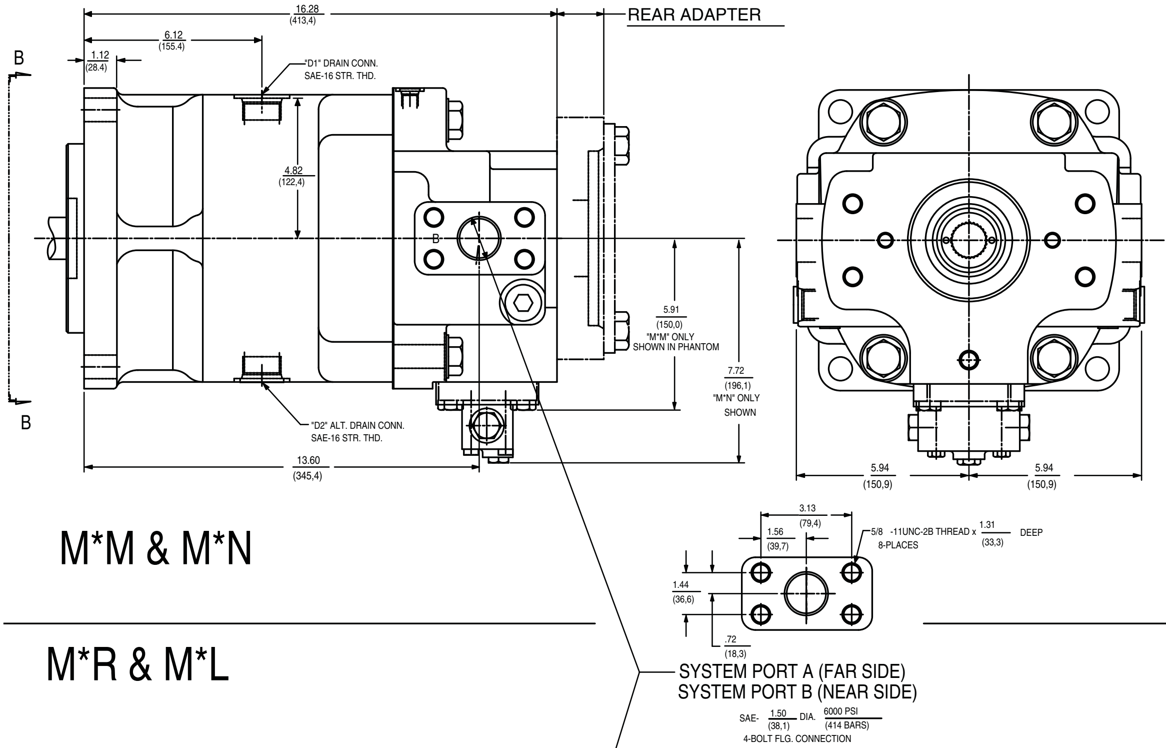
TABLE 15

MOTOR	L1	L2	L3	L4	L7
M11H, M11V & M14H, M14V	17.79 (451.9)	17.32 (439.9)	8.48 (215,3)	14.56 (369,9)	6.38 (162,0)

M*F & M*G



NOTE: See page 23 for shaft information.
See appropriate controls mounting starting on page 34.



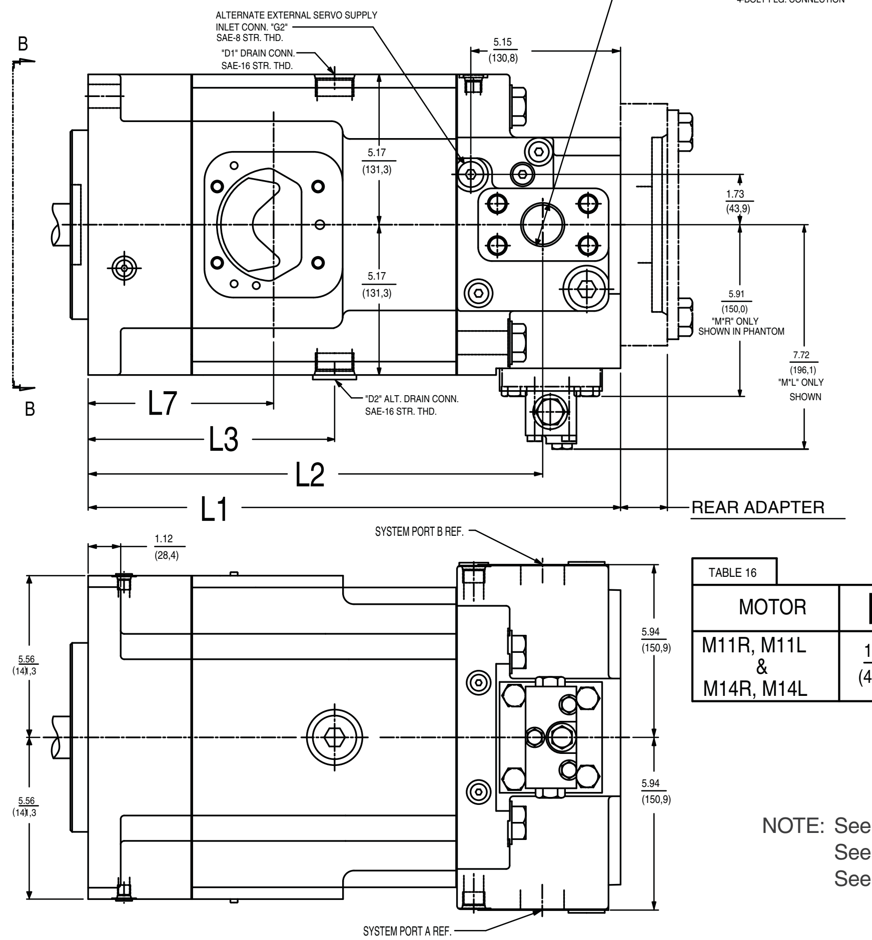
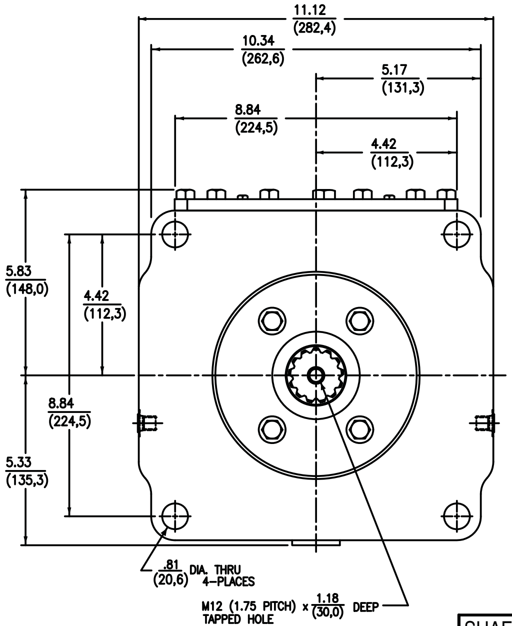


TABLE 16

MOTOR	L1	L2	L3	L4	L7
M11R, M11L & M14R, M14L	18.31 (465,2)	15.64 (397,1)	8.48 (215,3)	14.56 (369,9)	6.38 (162,0)

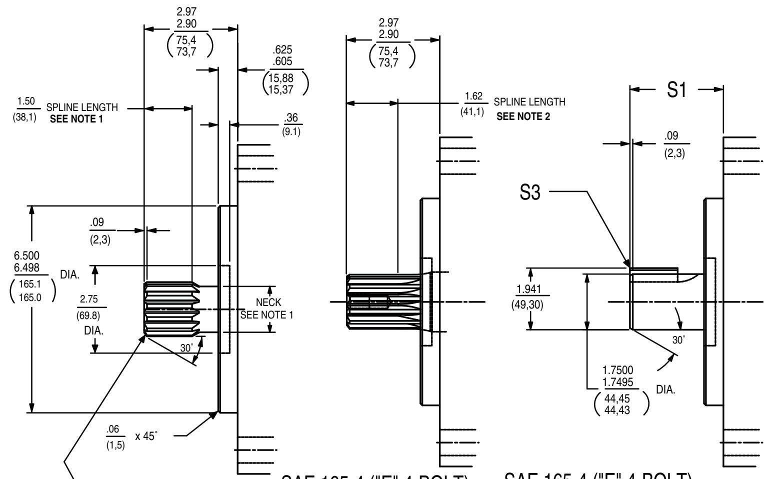
NOTE: See page 23 for shaft information.
See pages 45-54 for rear drive information.
See appropriate controls mounting starting on page 34.

M*F, M*G, M*H, M*V, P*S, P*X, P*P, P*V & P*F M*R, M*L, M*M, M*N, P*L & P*R



VIEW B-B

NOTES:
1. SPLINE LENGTH AND NECK ONLY FOR:
M*F, M*G, M*H, M*V, P*S, P*X, P*P, P*V & P*F
2. SPLINE LENGTH ONLY FOR:
M*R, M*L, M*M, M*N, P*L & P*R

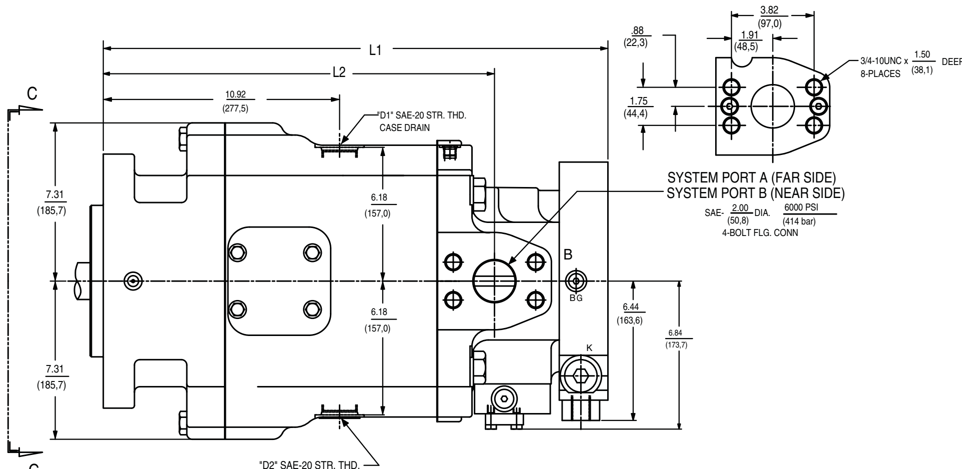


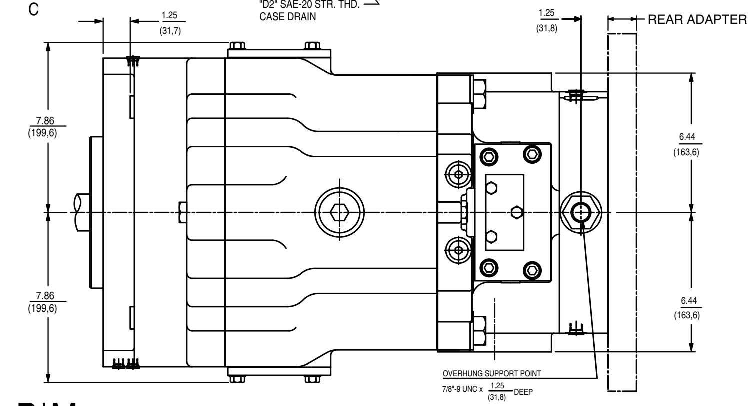
SAE 165-4 ("E" 4-BOLT)
SAE 44-4
("E" SPLINE)

SAE 165-4 ("E" 4-BOLT)
SAE 44-1
("E" KEYED)

SHAFT DEGIGNATION PUMP MODEL CODE	SAE INVOLUTE SPLINE DATA J498B 1969
03 or 08	FLAT ROOT SIDE FIT EXTERNAL CLASS 1 8/16 PITCH 30˚ PRESSURE ANGLE 13 TEETH 1.7210-1.7160 (43,713-43,586) MAJOR DIA.

SHAFT DEGIGNATION PUMP MODEL CODE	SHAFT	S1	S3
02 or 07	SAE 44-1 (SAE-E)	2.97/2.90 (75,4/73,7)	.437/.435 (11,10/11.05) SQ. KEY x LG. 1.50 (38,1)
09 or 10	SAE 44-1 LONG (SAE-E)	3.97/3.90 (100,8/99,1)	.437/.435 (11,10/11.05) SQ. KEY x LG. 2.50 (63,5)

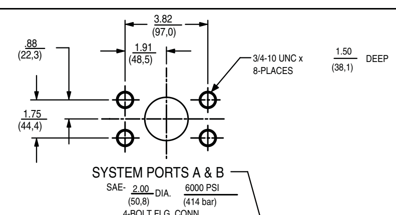




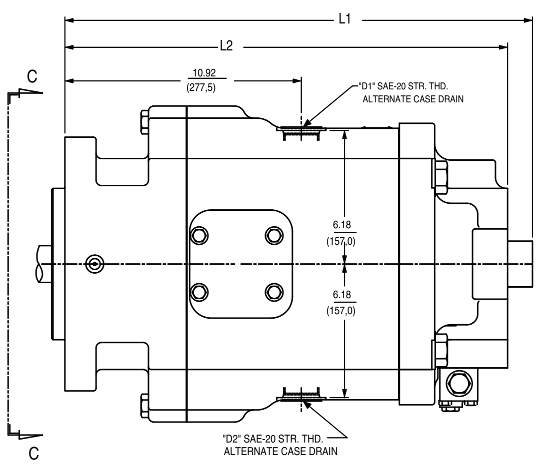
P*M

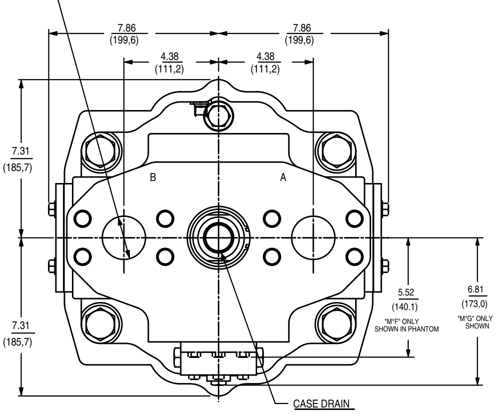
PUMP	L1	L2
P24M (SHOWN)	23.33 (592,6)	18.09 (459,4)
P30M	24.33 (618,0)	19.09 (484,8)

P*F



MOTOR	L1	L2
P24F (SHOWN)	21.61 (548,8)	20.46 (519,6)
P30F	22.61 (574,2)	21.46 (545,0)





NOTE: See page 32 for shaft information.

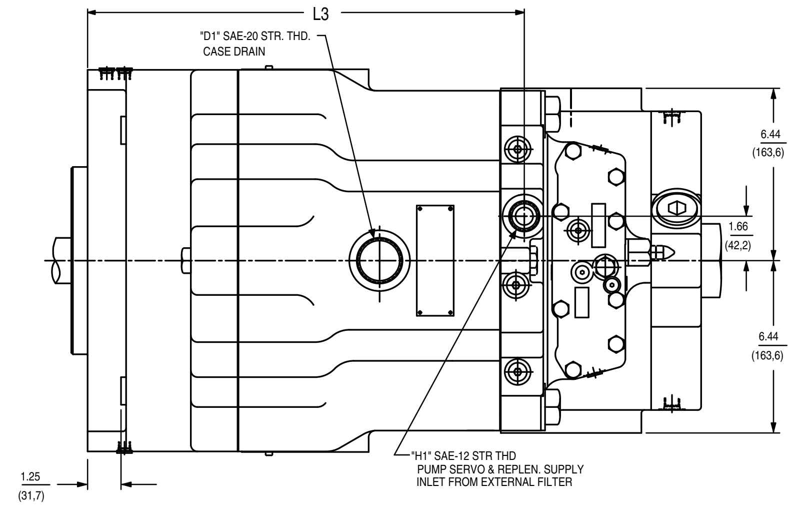
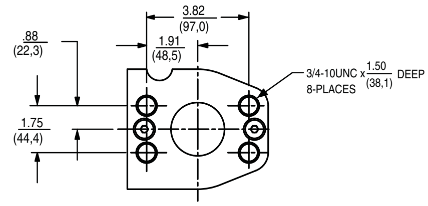
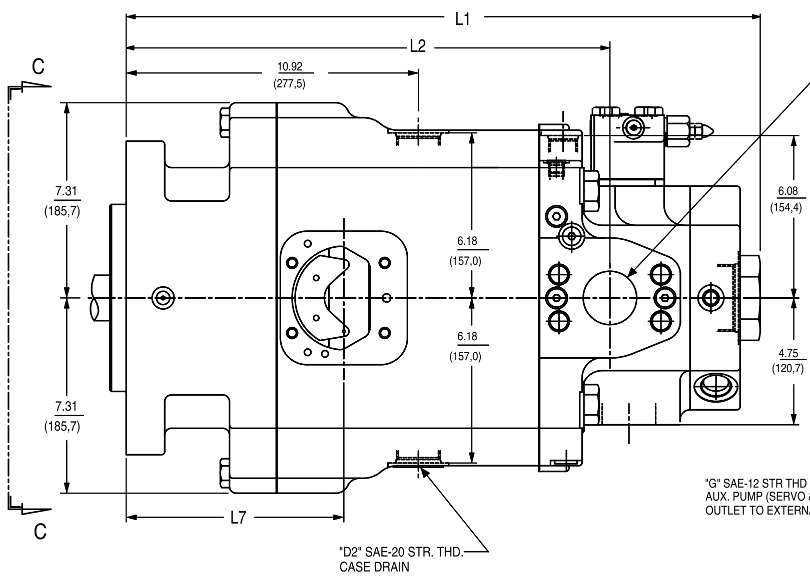
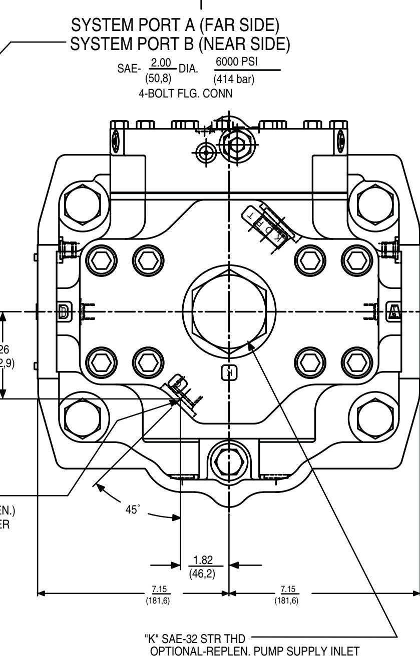


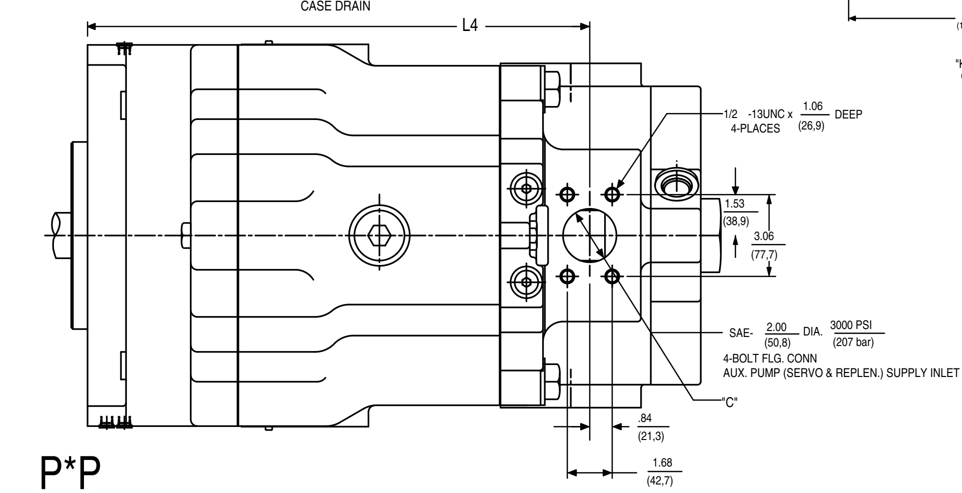
TABLE 10

PUMP	L1	L2	L3	L4	L7
P24P (SHOWN)	23.70 (602,1)	18.08 (459,4)	16.34 (414,9)	18.80 (477,4)	8.14 (206,7)
P30P	24.70 (627,5)	19.08 (484,7)	17.34 (440,3)	19.80 (502,8)	









P*P

NOTE: See page 32 for shaft information.
See appropriate controls mounting starting on page 34.

P24-P30 X Dimensions (Less Controls)

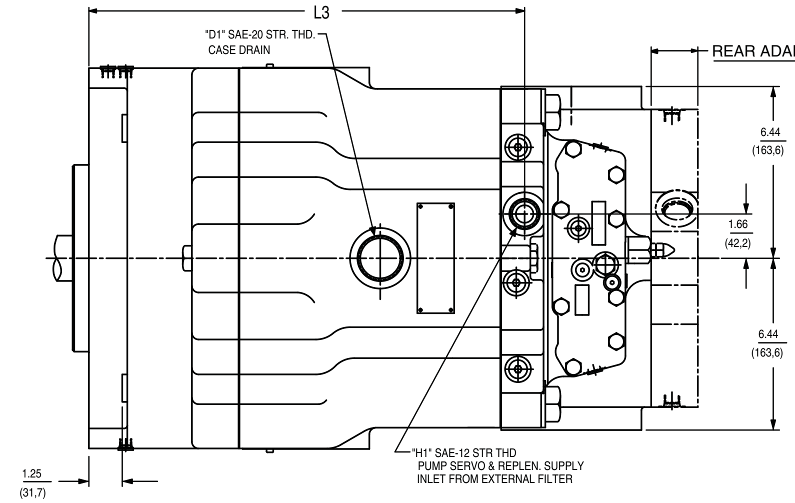
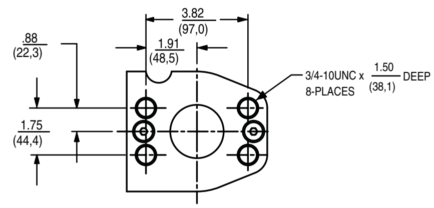
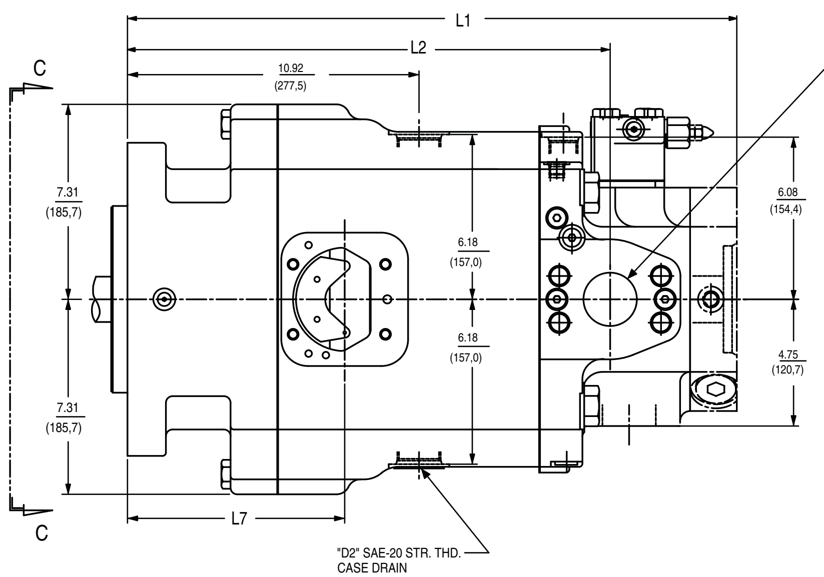
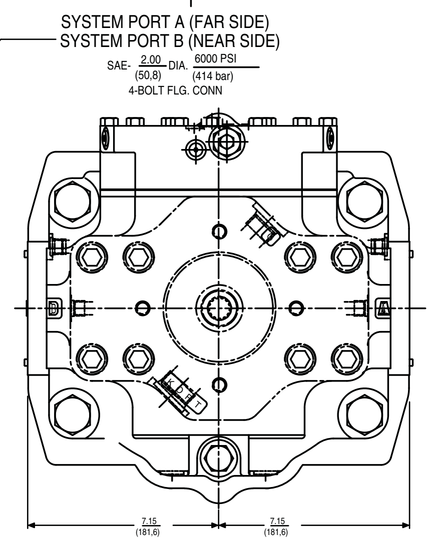


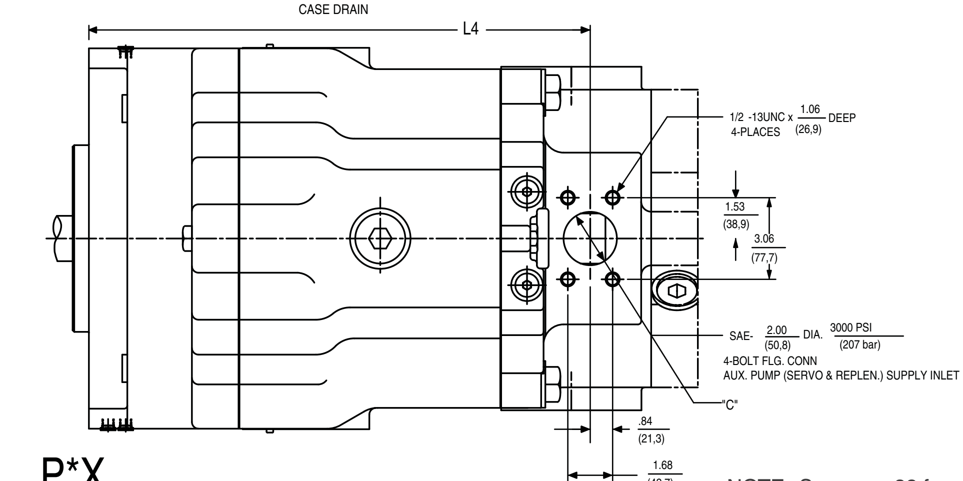
TABLE 11

PUMP	L1	L2	L3	L4	L7
P24X (SHOWN)	22.83 (579,9)	18.08 (459,4)	16.34 (414,9)	18.80 (477,4)	8.14 (206,7)
P30X	23.83 (605,3)	19.08 (484,7)	17.34 (440,3)	19.80 (502,8)	



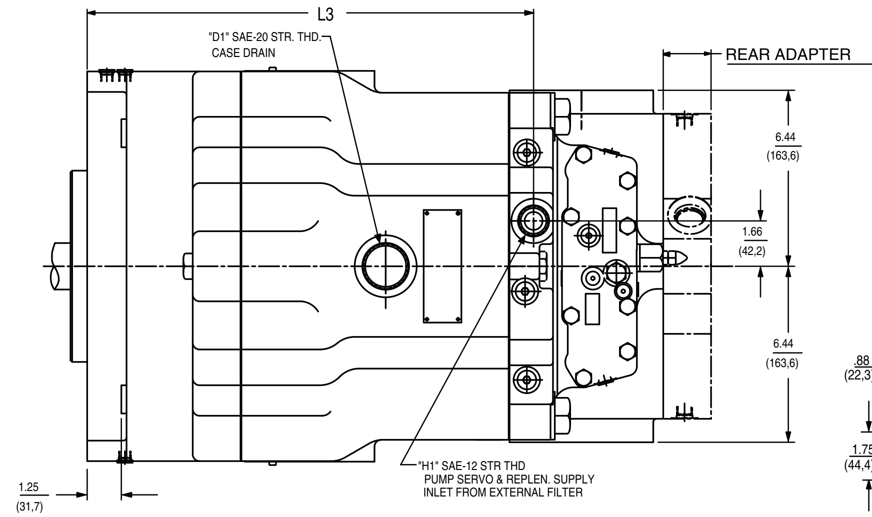


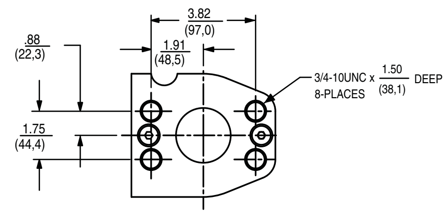


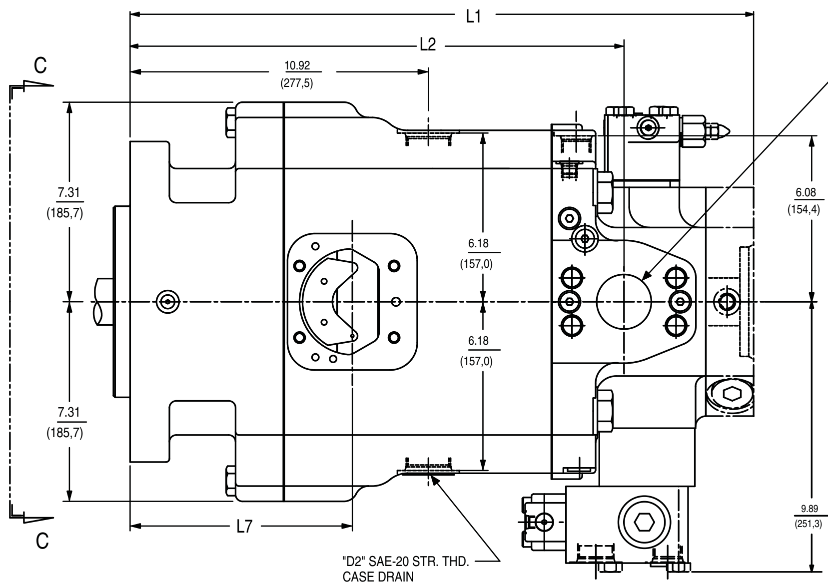


P*X

NOTE: See page 32 for shaft information.
See pages 45-53 for rear drive information.
See appropriate controls mounting starting on page 34.







SYSTEM PORT A (FAR SIDE)
SYSTEM PORT B (NEAR SIDE)
SAE- 2.00 (50,8) DIA. 6000 PSI (414 bar)
4-BOLT FLG. CONN

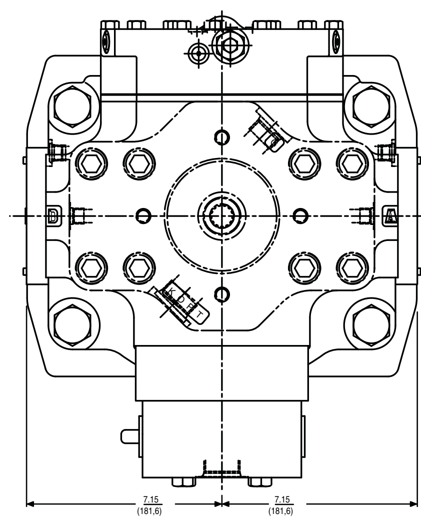
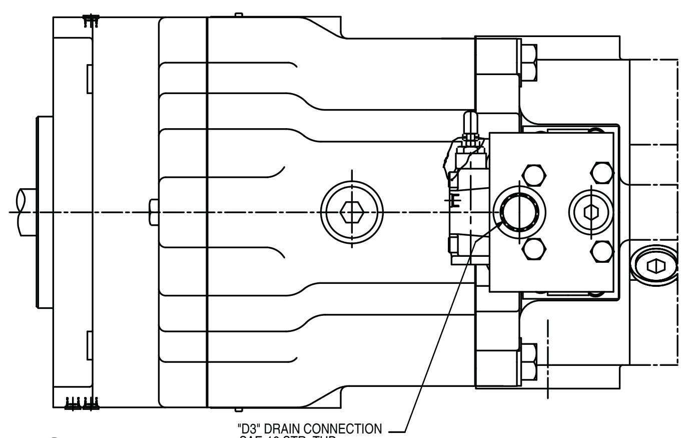


TABLE 9

PUMP	L1	L2	L3	L7
P24S (SHOWN)	22.83 (579,9)	18.09 (459,4)	16.34 (414,9)	8.14 (206,7)
P30S	23.83 (605,3)	19.09 (484,8)	17.34 (440,3)	



P*S

NOTE: See page 32 for shaft information.
See pages 45-53 for rear drive information.
See appropriate controls mounting starting on page 34.

P24-P30 R, L Dimensions (Less Controls)

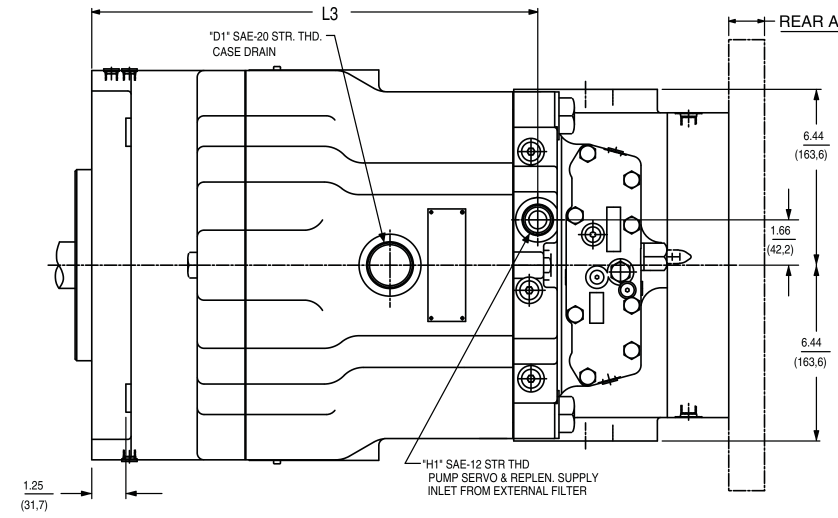
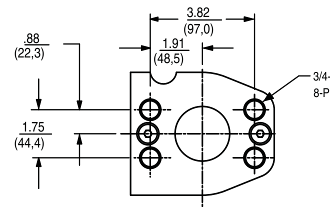
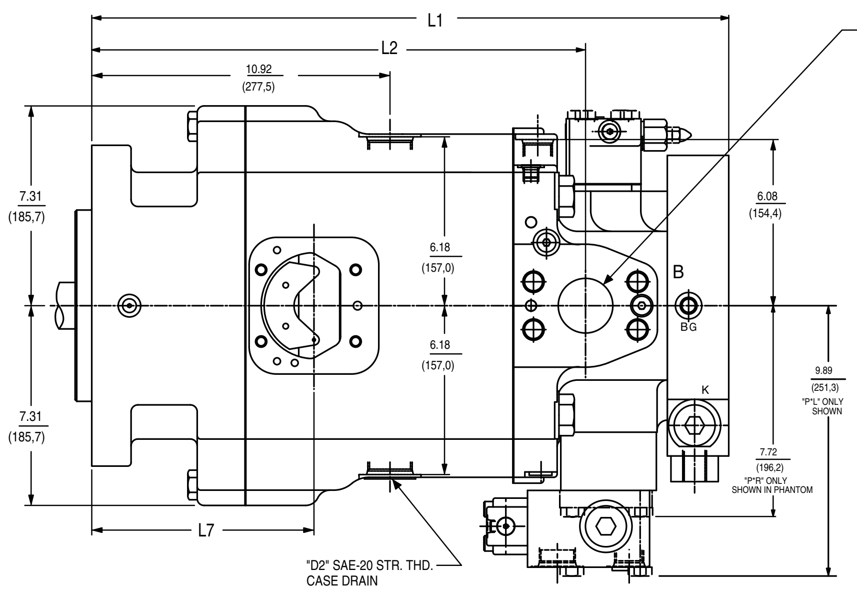
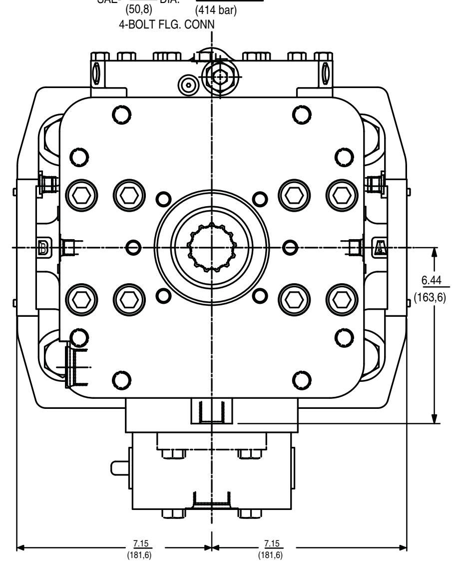


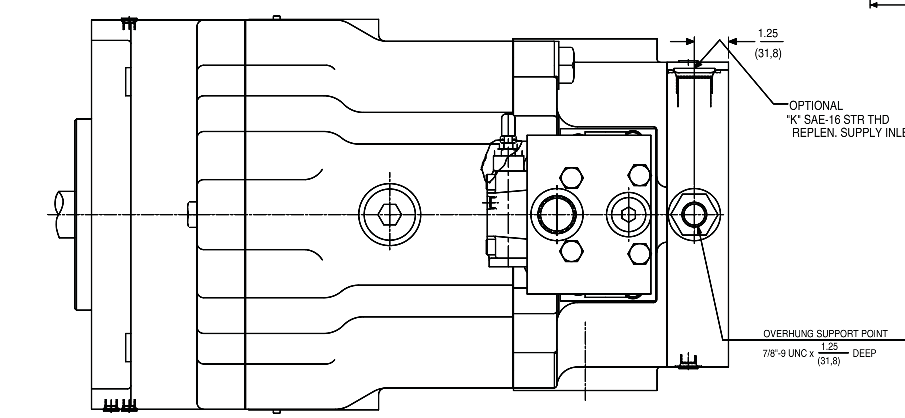
TABLE 12

PUMP	L1	L2	L3	L7
P24 (SHOWN)	23.33 (592,6)	18.08 (459,4)	16.34 (414,9)	8.14 (206,7)
P30	24.33 (618,0)	19.08 (484,7)	17.34 (440,3)	









P*R & P*L

NOTE: See page 32 for shaft information.
See pages 45-54 for rear drive information.
See appropriate controls mounting starting on page 34.

M*H & M*V

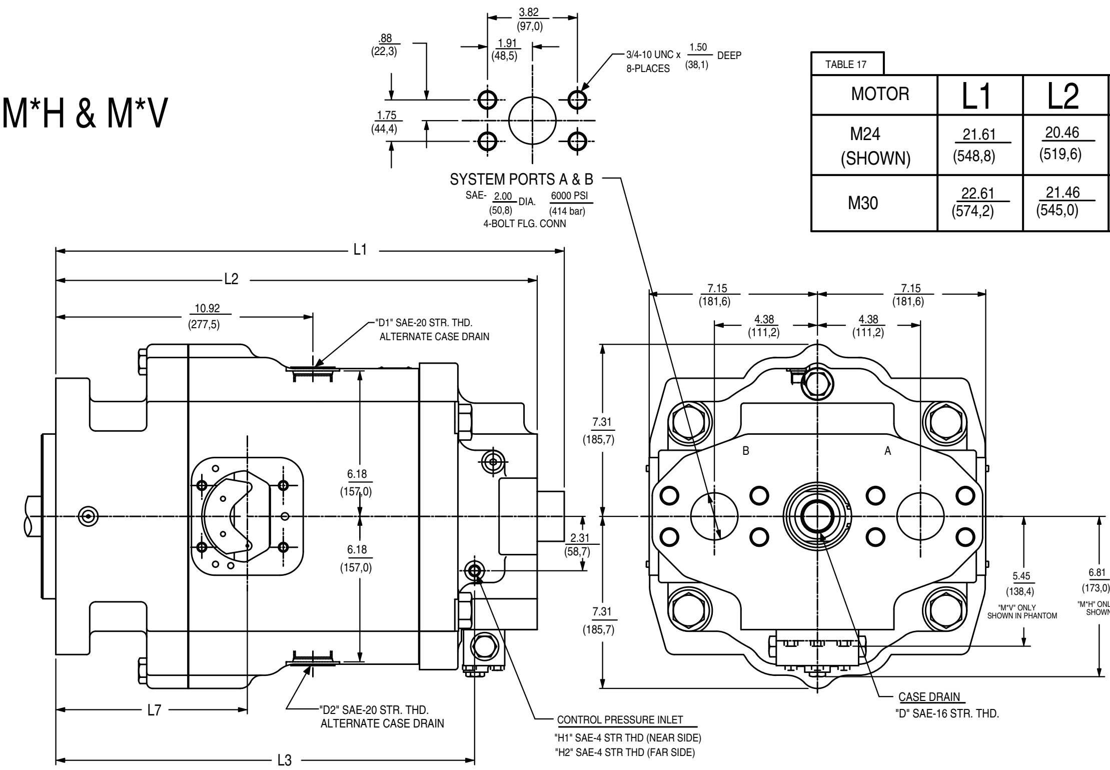
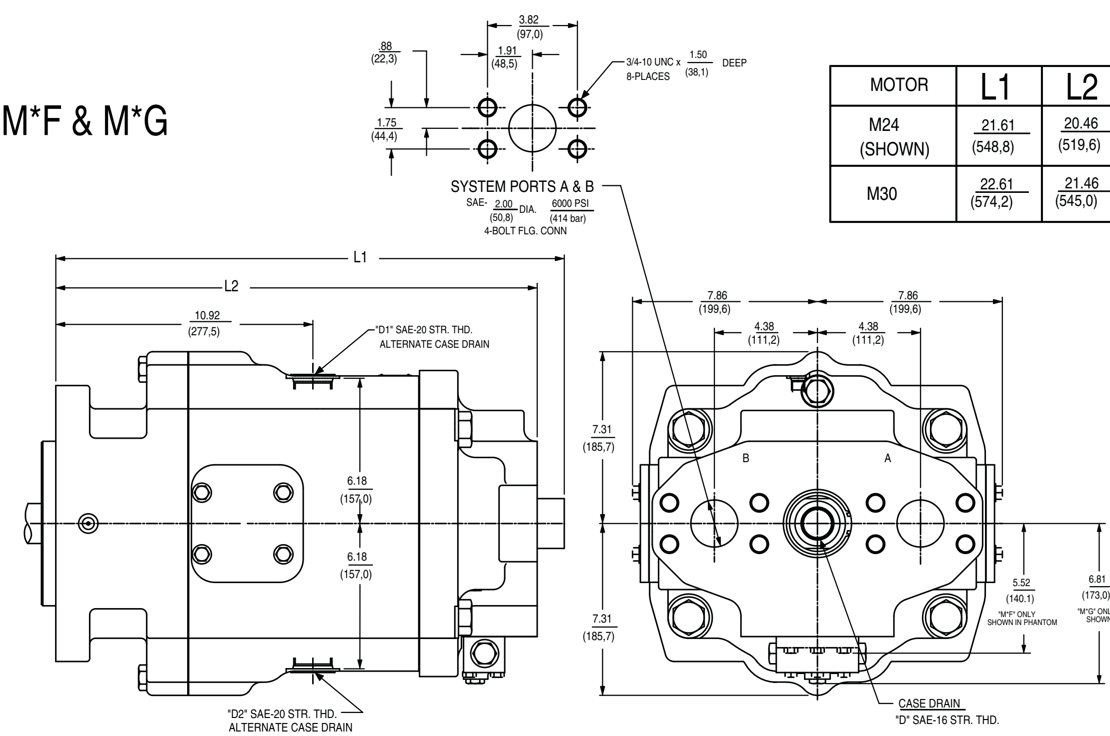


TABLE 17

MOTOR	L1	L2	L3	L7
M24 (SHOWN)	21.61 (548,8)	20.46 (519,6)	17.80 (452,0)	8.14 (206,7)
M30	22.61 (574,2)	21.46 (545,0)	18.80 (477,4)	

M*F & M*G

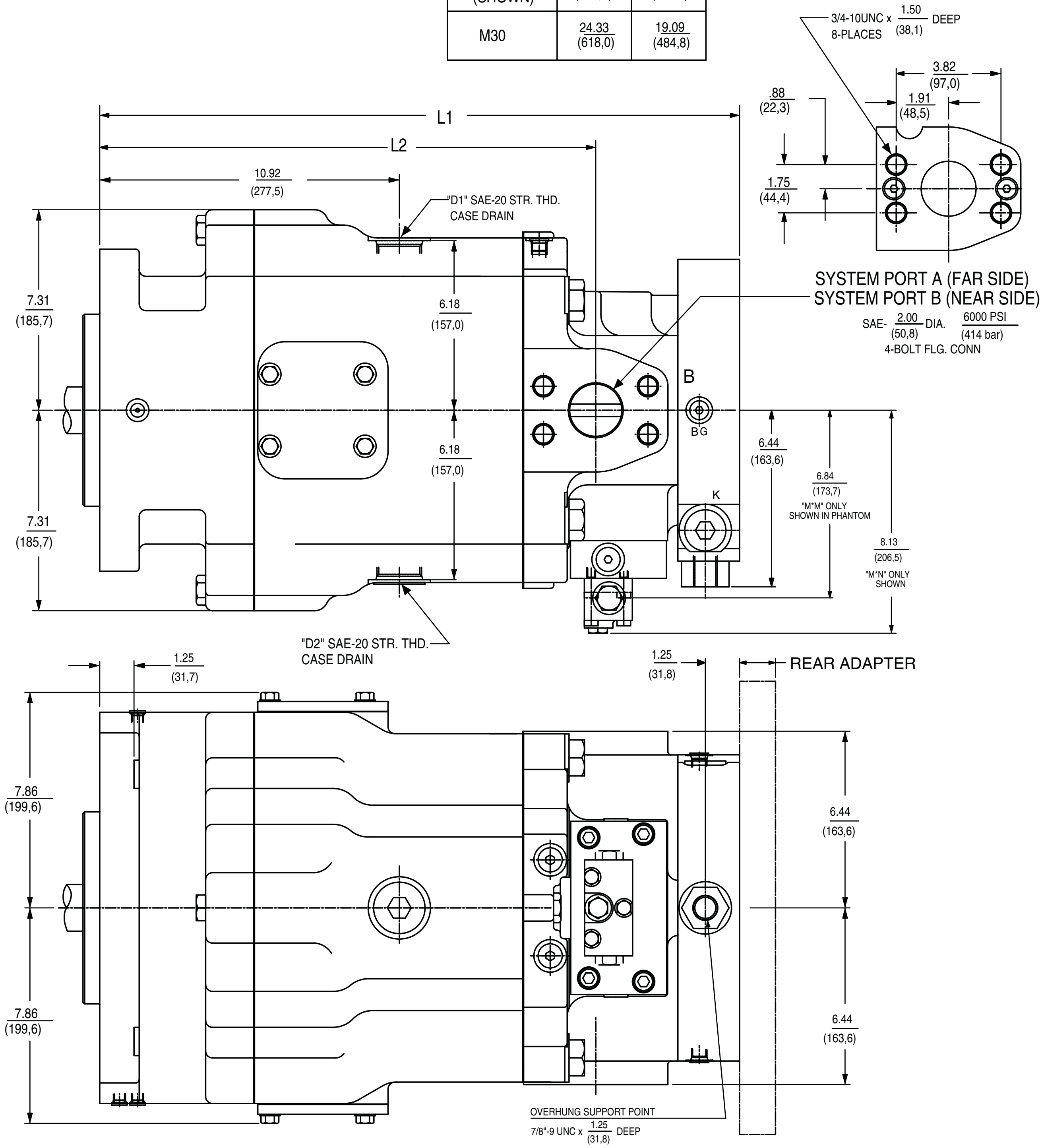


MOTOR	L1	L2
M24 (SHOWN)	21.61 (548,8)	20.46 (519,6)
M30	22.61 (574,2)	21.46 (545,0)

NOTE: See page 32 for shaft information.
See appropriate controls mounting starting on page 34.

M*M & M*N

PUMP	L1	L2
M24 (SHOWN)	23.33 (592,6)	18.09 (459,4)
M30	24.33 (618,0)	19.09 (484,8)

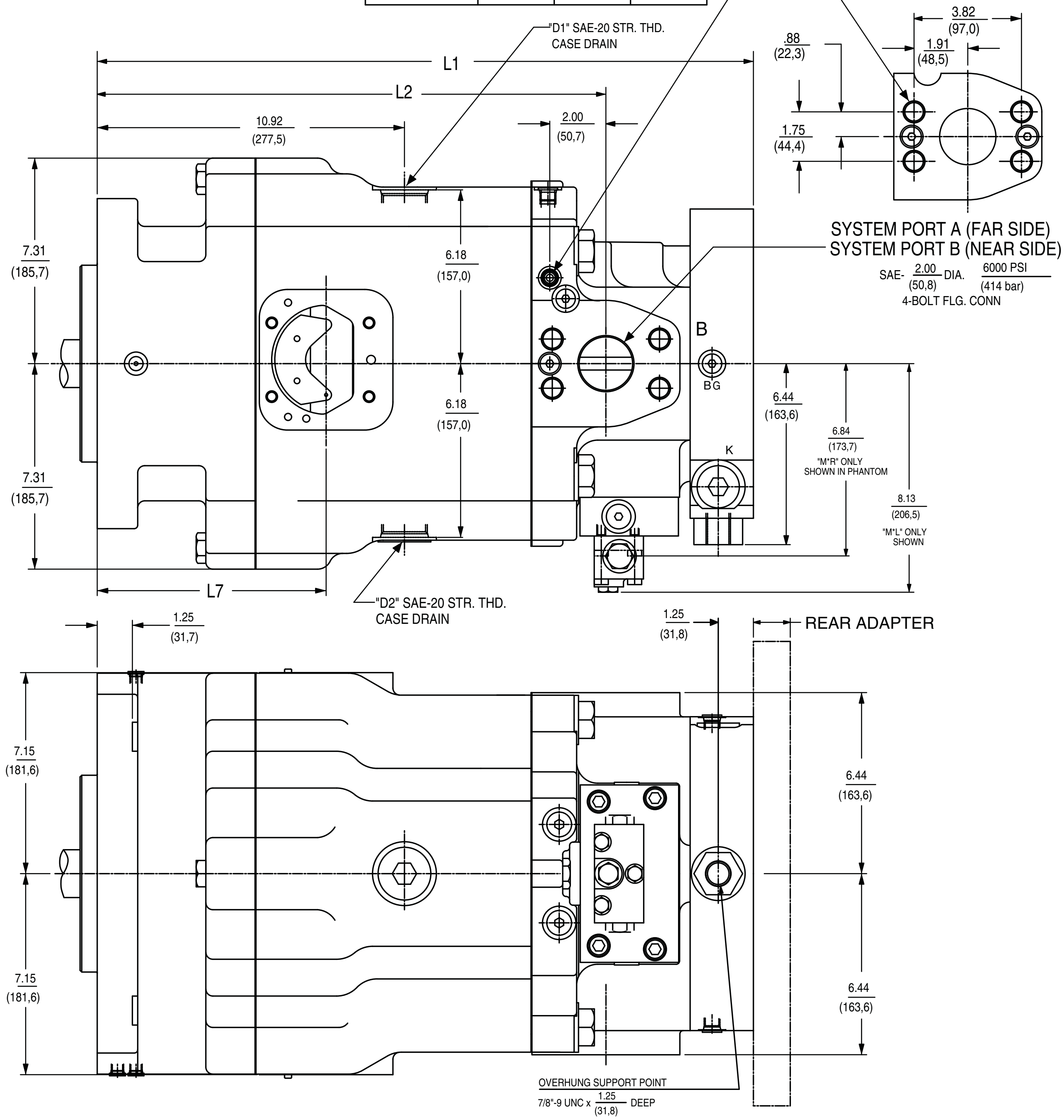


NOTE: See page 32 for shaft information.
See pages 45-54 for rear drive information.

M*R & M*L

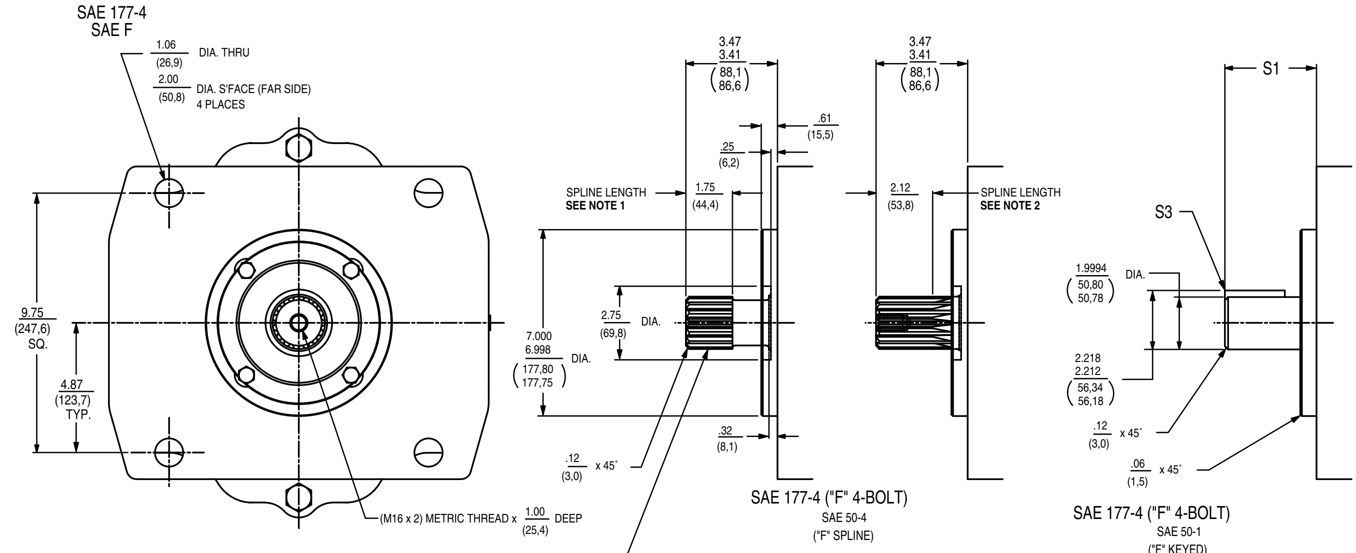
TABLE 18

PUMP	L1	L2	L7
M24 (SHOWN)	23.33 (592,6)	18.09 (459,4)	8.14 (206,7)
M30	24.33 (618,0)	19.09 (484,8)	



NOTE: See page 32 for shaft information.
See pages 45-54 for rear drive information.
See appropriate controls mounting starting on page 34.

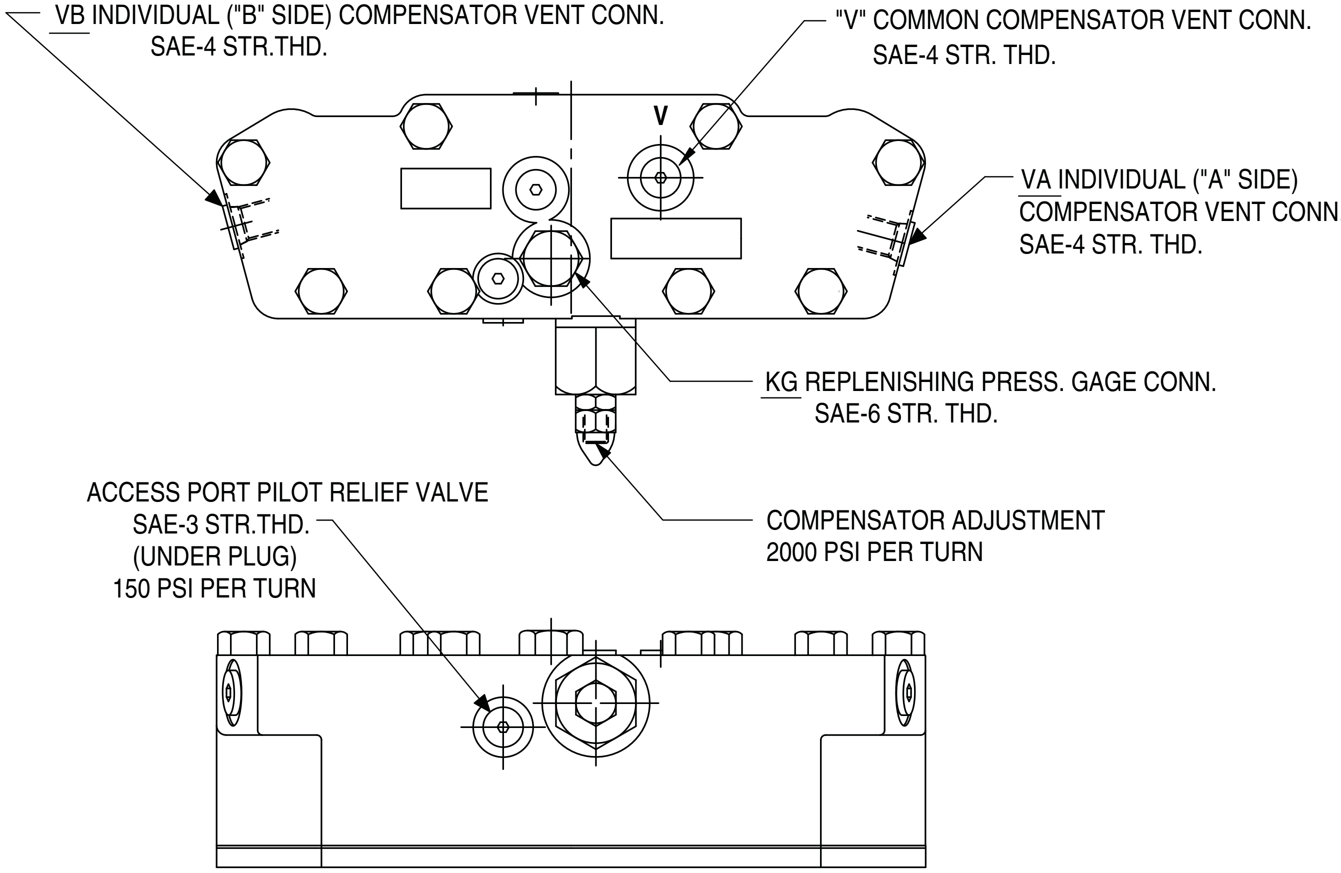
M*F, M*G, M*H, M*V, P*S, P*X, P*P & P*F M*R, M*L, M*M, M*N, P*L & P*R



NOTES:
1. SPLINE LENGTH AND NECK ONLY FOR:
M*F, M*G, M*H, M*V, P*S, P*X, P*P & P*F
2. SPLINE LENGTH ONLY FOR:
M*R, M*L, M*M, M*N, P*L & P*R

SHAFT DEGIGNATION PUMP MODEL CODE	SAE INVOLUTE SPLINE DATA J498-B 1969
03 or 08	FLAT ROOT SIDE FIT EXTERNAL CLASS-1 8/16 PITCH 30˚ PRESSURE ANGLE 15 TEETH 1.9710-1.9660/ (50,063-49,936) MAJOR DIA.

SHAFT DEGIGNATION PUMP MODEL CODE	SHAFT	S1	S3		
02 or 07	SAE 50-1 (SAE-F)	3.47/3.41 (88,1/86,6)	.500/.498 (12,70/12.65)	SQ. KEY x LG.	2.25 (57,1)
09 or 10	SAE 50-1 LONG (SAE-F)	5.35/5.29 (135,9/134,4)	.500/.498 (12,70/12.65)	SQ. KEY x LG.	4.13 (104,9)


VB INDIVIDUAL ("B" SIDE) COMPENSATOR VENT CONN.
SAE-4 STR.THD.
"V" COMMON COMPENSATOR VENT CONN.
SAE-4 STR. THD.
V
VA INDIVIDUAL ("A" SIDE)
COMPENSATOR VENT CONN.
SAE-4 STR. THD.
KG REPLENISHING PRESS. GAGE CONN.
SAE-6 STR. THD.
ACCESS PORT PILOT RELIEF VALVE
SAE-3 STR.THD.
(UNDER PLUG)
150 PSI PER TURN
COMPENSATOR ADJUSTMENT
2000 PSI PER TURN

-B- CONTROL MTG. POSITION				
CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"
"10*"	1	CW	CCW	INLET
	1	CCW	CW	INLET

-A- CONTROL MTG. POSITION				
CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"
"10*"	2	CW	CW	INLET
	2	CCW	CCW	INLET

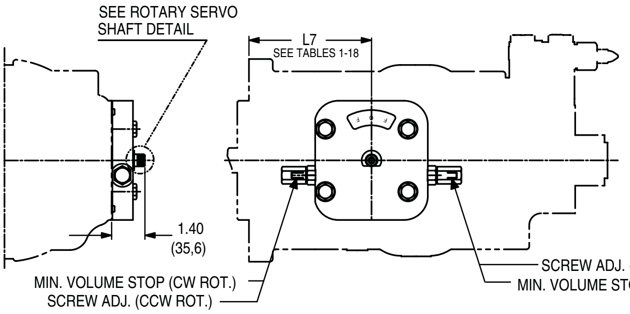


FIGURE -1

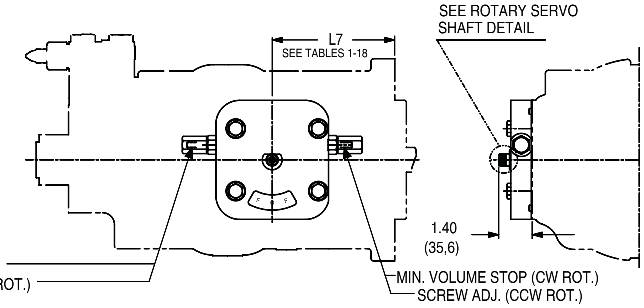
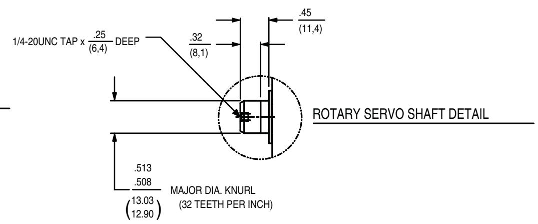


FIGURE -2



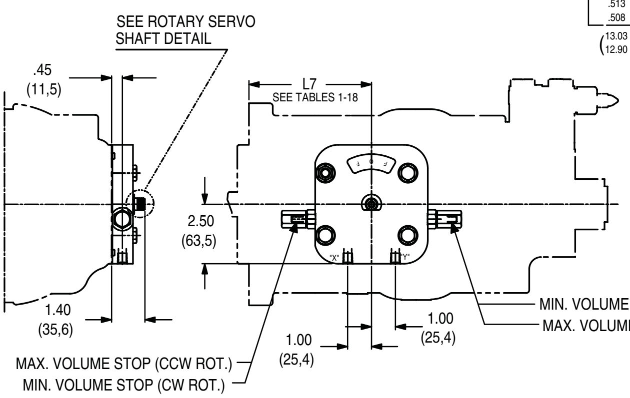


FIGURE -1

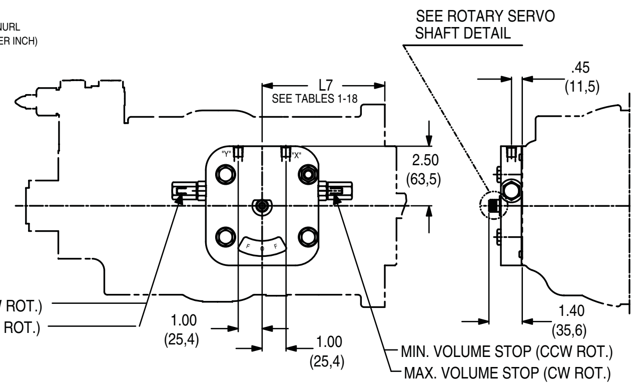


FIGURE -2

-B- CONTROL MTG. POSITION					
CONTROL SPRING OFF-SET TO MIN, VOLUME					
CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "X"	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "Y"	PORT "A"
"2A*"	1	CW	MAX. VOL.	MIN. VOL.	INLET
	1	CCW	MIN. VOL.	MAX. VOL.	INLET

-A- CONTROL MTG. POSITION					
CONTROL SPRING OFF-SET TO MIN, VOLUME					
CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "X"	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "Y"	PORT "A"
"2A*"	2	CW	MIN. VOL.	MAX. VOL.	INLET
	2	CCW	MAX. VOL.	MIN. VOL.	INLET

-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT:	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"2H*"	1	CW	"X"	CCW	INLET	OUTLET
	1	CCW	"Y"	CW	INLET	OUTLET
	1	CW	"Y"	CW	OUTLET	INLET
	1	CCW	"X"	CCW	OUTLET	INLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT:	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"2H*"	2	CW	"Y"	CW	INLET	OUTLET
	2	CCW	"X"	CCW	INLET	OUTLET
	2	CW	"X"	CCW	OUTLET	INLET
	2	CCW	"Y"	CW	OUTLET	INLET

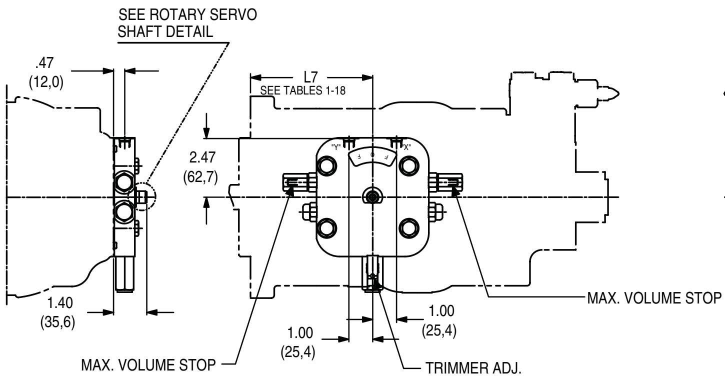


FIGURE -1

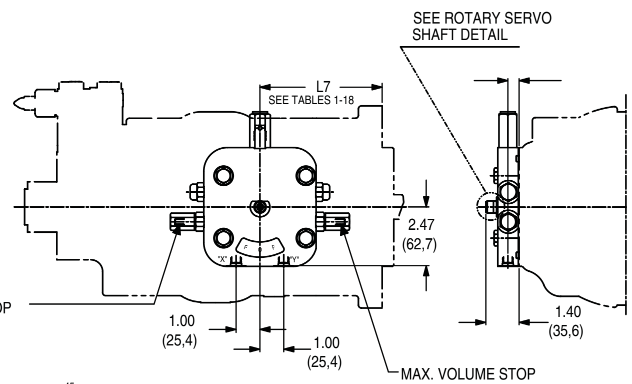
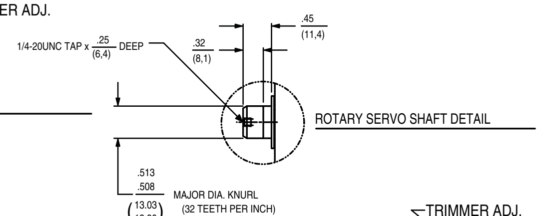


FIGURE -2



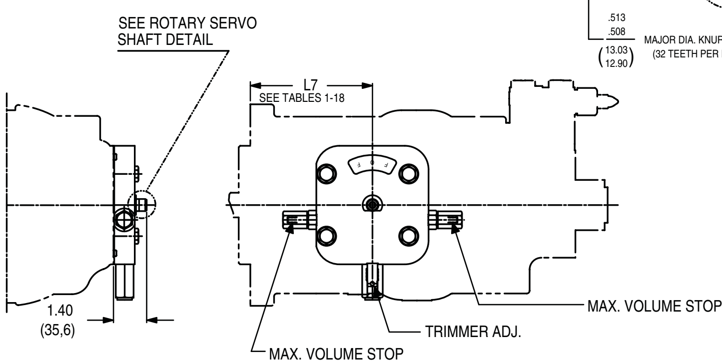


FIGURE -1

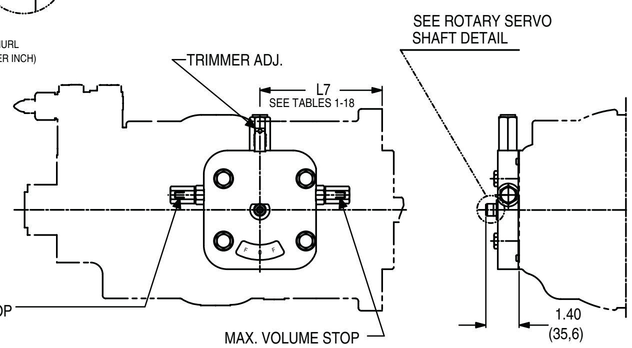


FIGURE -2

-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"4A*"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"4A*"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET

-B- CONTROL MTG. POSITION					
CONTROL SPRING OFF-SET TO MIN, VOLUME					
CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"5A*"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

-A- CONTROL MTG. POSITION					
CONTROL SPRING OFF-SET TO MIN, VOLUME					
CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"5A*"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET

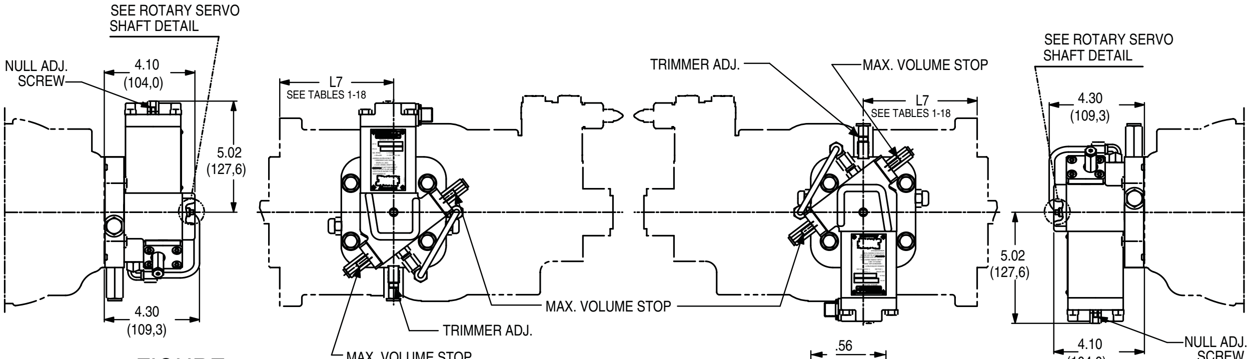
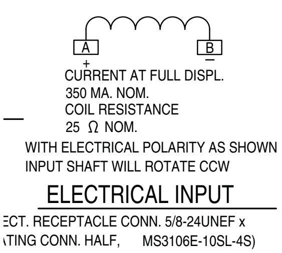
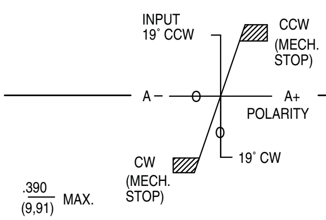
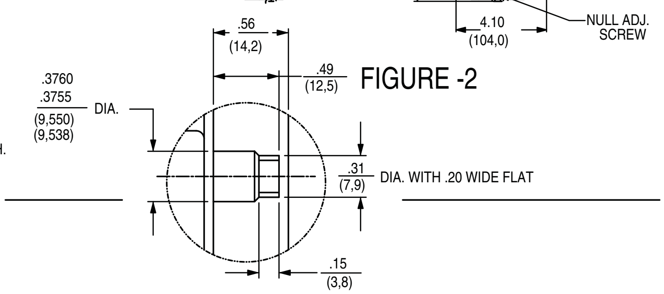


FIGURE -1

FIGURE -2







MANUAL OVERRIDE DETAIL

TO OPERATE, DISCONNECT OIL SUPPLY TO STROKER
DO NOT EXCEED 50in/lbs (6 N.m) TORQUE.

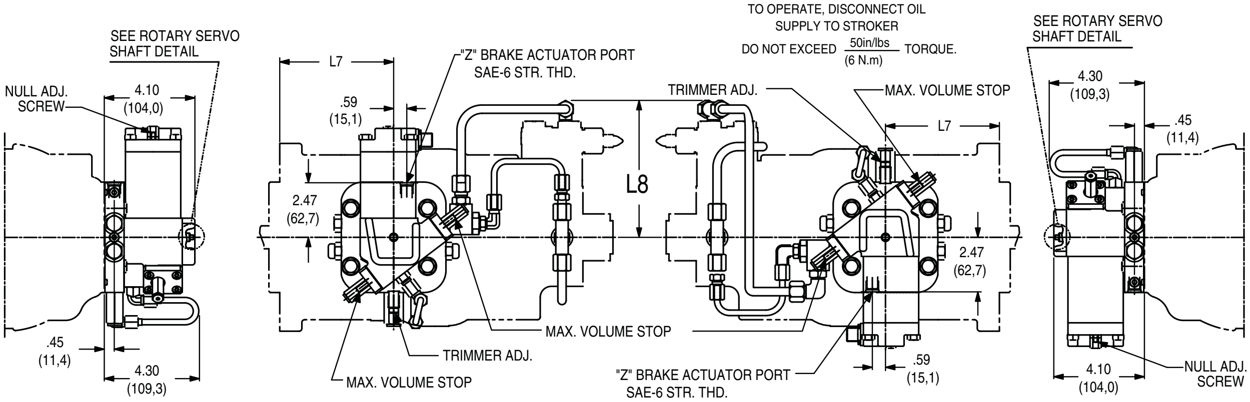


FIGURE -1

FIGURE -2

-B- CONTROL MTG. POSITION					
CONTROL SPRING OFF-SET TO MIN, VOLUME					
CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"5C*"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

SERIES SIZE	L7	L8
6, 7 & 8 (SAE 127-2)	5.15 (130,9)	6.20 (157,4)
6, 7 & 8 (SAE 152-4)	6.49 (164,8)	
11 & 14	6.38 (162,0)	6.77 (171,9)
24 & 30	8.14 (206,7)	8.64 (219,4)

-A- CONTROL MTG. POSITION					
CONTROL SPRING OFF-SET TO MIN, VOLUME					
CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"5C*"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET

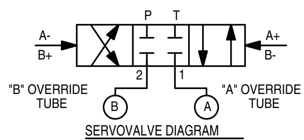
-B- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	IINDICATOR ROTATION	PORT "A"	PORT "B"
"7D*"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

SERIES SIZE	L7	L8	L9
6, 7 & 8 (SAE 127-2)	5.15 (130,9)	9.43 (239,6)	5.63 (143,1)
6, 7 & 8 (SAE 152-4)	6.49 (164,8)		
11 & 14	6.38 (162,0)	10.00 (254,1)	6.20 (157,5)
24 & 30	8.14 (206,7)	11.87 (301,5)	8.07 (205,0)

-A- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	IINDICATOR ROTATION	PORT "A"	PORT "B"
"7D*"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET



SERVOVALVE DIAGRAM

PUMP ROT.	CAM	SERVOVALVE COIL POLARITY	SERVOVALVE PORTING	PORT "A"	PORT "B"
CW	ABOVE	A+ or B-	P---2 ►	OUTLET	INLET
CW	BELOW	A- or B+	P---1 ►	INLET	OUTLET
CCW	BELOW	A+ or B-	P---2 ►	OUTLET	INLET
CCW	ABOVE	A- or B+	P---1 ►	INLET	OUTLET

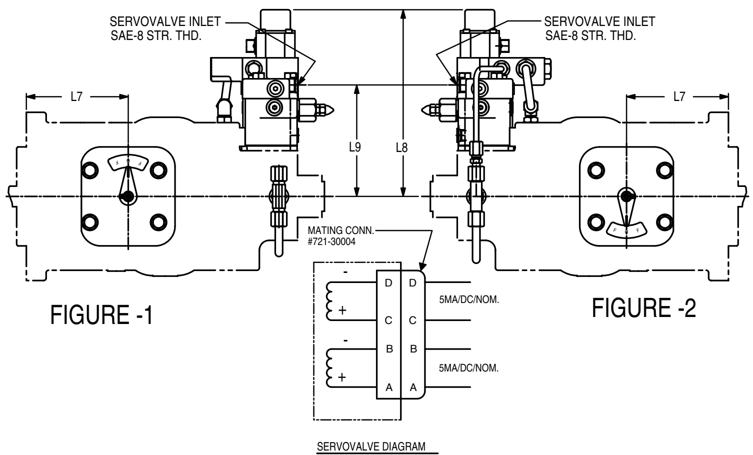


FIGURE -1
FIGURE -2

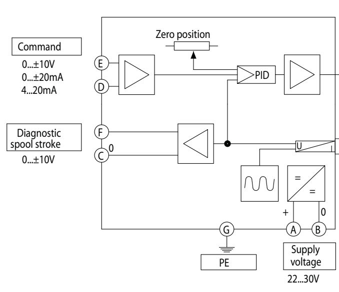
-B- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	VALVE COMMAND D TO E	VOL. INDICATOR SHAFT ROT. (SHOWN)	PORT "A"	PORT "B"
"7J*"	1	CW	0...-10V	CCW	INLET	OUTLET
	1	CCW	0...-10V	CW	INLET	OUTLET
	1	CW	0...+10V	CW	OUTLET	INLET
	1	CCW	0...+10V	CCW	OUTLET	INLET

SERIES SIZE	L7	L8	L9	L10
6, 7 & 8 (SAE 127-2)	5.15 (130,9)	12.70 (322,6)	5.63 (143,1)	7.66 (194,6)
6, 7 & 8 (SAE 152-4)	6.49 (164,8)			
11 & 14	6.38 (162,0)	14.37 (365,0)	6.20 (157,5)	
24 & 30	8.14 (206,7)	14.58 (370,3)	8.07 (205,0)	

-A- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	VALVE COMMAND D TO E	VOL. INDICATOR SHAFT ROT. (SHOWN)	PORT "A"	PORT "B"
"7J*"	2	CW	0...-10V	CW	INLET	OUTLET
	2	CCW	0...-10V	CCW	INLET	OUTLET
	2	CW	0...+10V	CCW	OUTLET	INLET
	2	CCW	0...+10V	CW	OUTLET	INLET



D1FP (DF Plus) WIRING SCHEMATIC

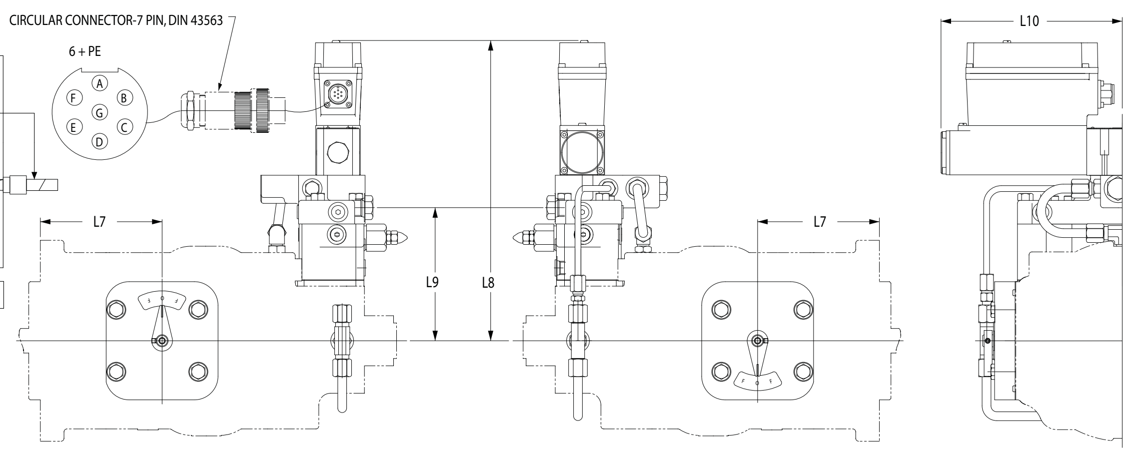


FIGURE -1
FIGURE -2

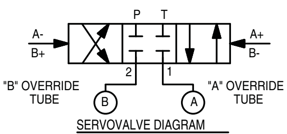
-B- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"7F*"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

SERIES SIZE	L7	L8	L9
6, 7 & 8 (SAE 127-2)	5.15 (130,9)	9.43 (239,6)	5.63 (143,1)
6, 7 & 8 (SAE 152-4)	6.49 (164,8)		
11 & 14	6.38 (162,0)	10.00 (254,1)	6.20 (157,5)
24 & 30	8.14 (206,7)	11.87 (301,5)	8.07 (205,0)

-A- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"7F*"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET



PUMP ROT.	CAM	SERVOVALVE COIL POLARITY	SERVOVALVE PORTING	PORT "A"	PORT "B"
CW	ABOVE	A+ or B-	P---2 ►	OUTLET	INLET
CW	BELOW	A- or B+	P---1 ►	INLET	OUTLET
CCW	BELOW	A+ or B-	P---2 ►	OUTLET	INLET
CCW	ABOVE	A- or B+	P---1 ►	INLET	OUTLET

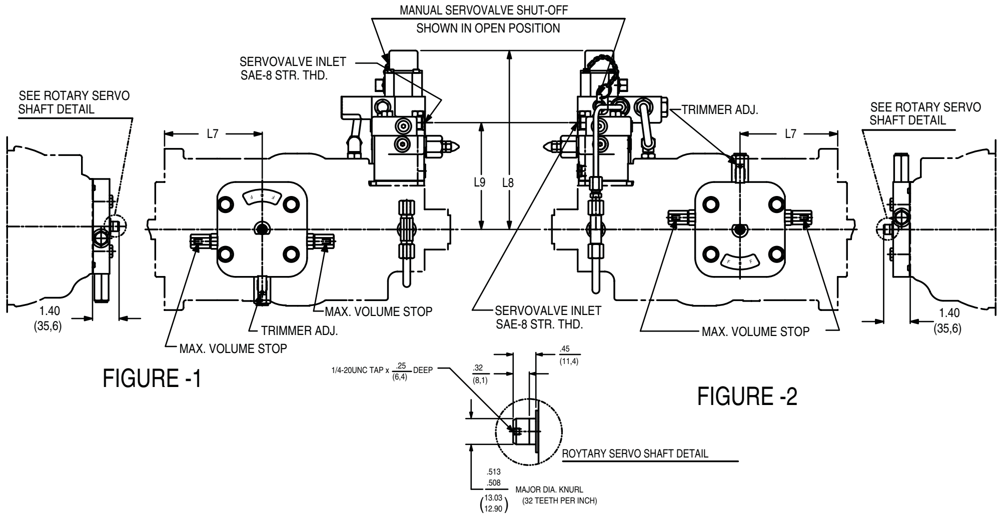


FIGURE -1

FIGURE -2

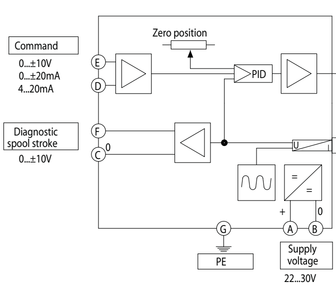
-B- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	VALVE COMMAND D TO E	CONTROL INPUT SHAFT ROT. (SHOWN)	PORT "A"	PORT "B"
"7K*"	1	CW	0...-10V	CCW	INLET	OUTLET
	1	CCW	0...-10V	CW	INLET	OUTLET
	1	CW	0...+10V	CW	OUTLET	INLET
	1	CCW	0...+10V	CCW	OUTLET	INLET

SERIES SIZE	L7	L8	L9	L10
6,7 & 8 (SAE 127-2)	5.15 (130,9)	12.70 (322,6)	5.63 (143,1)	7.66 (194,6)
6,7 & 8 (SAE 152-4)	6.49 (164,8)			
11 & 14	6.38 (162,0)	14.37 (365,0)	6.20 (157,5)	
24 & 30	8.14 (206,7)	14.58 (370,3)	8.07 (205,0)	

-A- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	VALVE COMMAND D TO E	CONTROL INPUT SHAFT ROT. (SHOWN)	PORT "A"	PORT "B"
"7K*"	2	CW	0...-10V	CW	INLET	OUTLET
	2	CCW	0...-10V	CCW	INLET	OUTLET
	2	CW	0...+10V	CCW	OUTLET	INLET
	2	CCW	0...+10V	CW	OUTLET	INLET



D1FP (DF Plus) WIRING SCHEMATIC

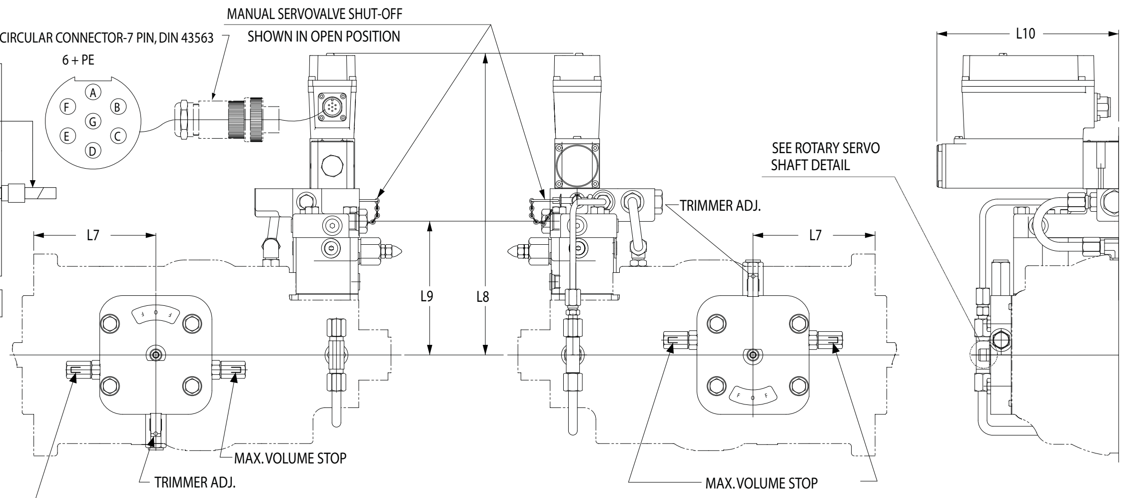


FIGURE -1

FIGURE -2

-B- CONTROL MTG. POSITION

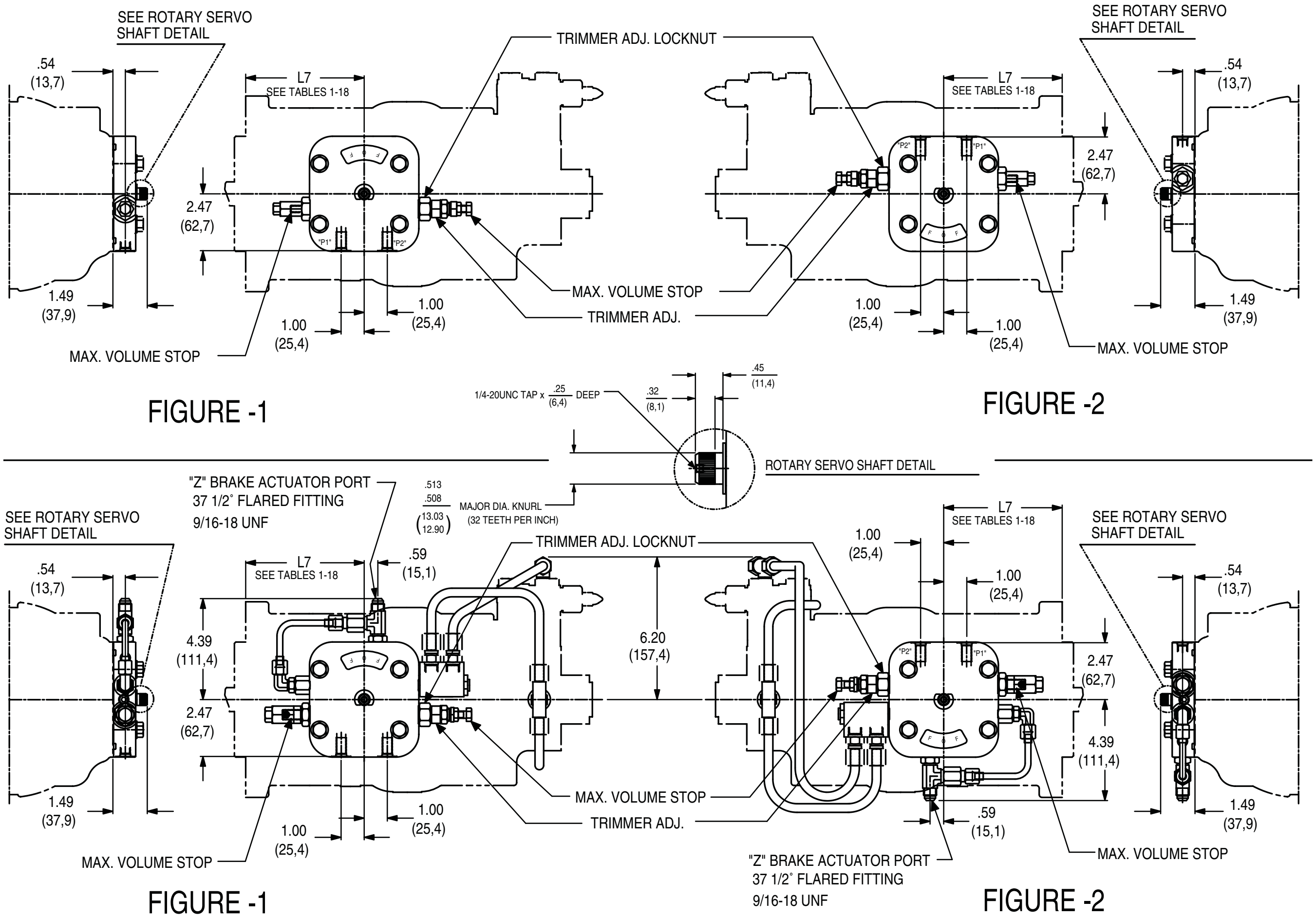
CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT:	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"8A*"	1	CW	"P1"	CCW	INLET	OUTLET
	1	CCW	"P2"	CW	INLET	OUTLET
	1	CW	"P2"	CW	OUTLET	INLET
	1	CCW	"P1"	CCW	OUTLET	INLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT:	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"8A*"	2	CW	"P2"	CW	INLET	OUTLET
	2	CCW	"P1"	CCW	INLET	OUTLET
	2	CW	"P1"	CCW	OUTLET	INLET
	2	CCW	"P2"	CW	OUTLET	INLET



-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT:	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"8C*"	1	CW	"P1"	CCW	INLET	OUTLET
	1	CCW	"P2"	CW	INLET	OUTLET
	1	CW	"P2"	CW	OUTLET	INLET
	1	CCW	"P1"	CCW	OUTLET	INLET

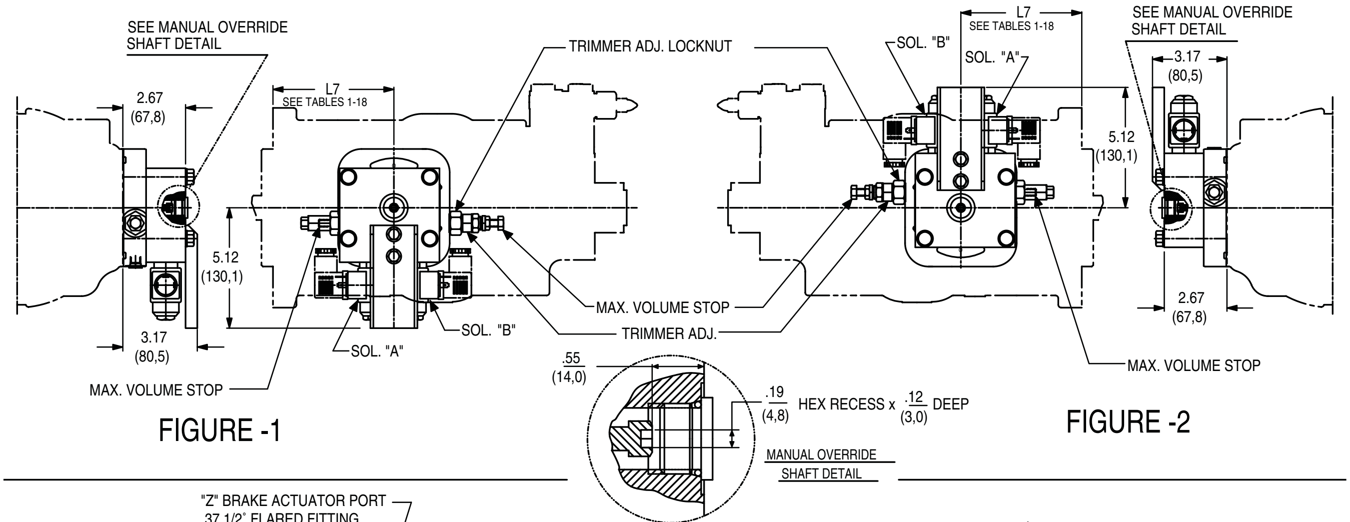
-A- CONTROL MTG. POSITION

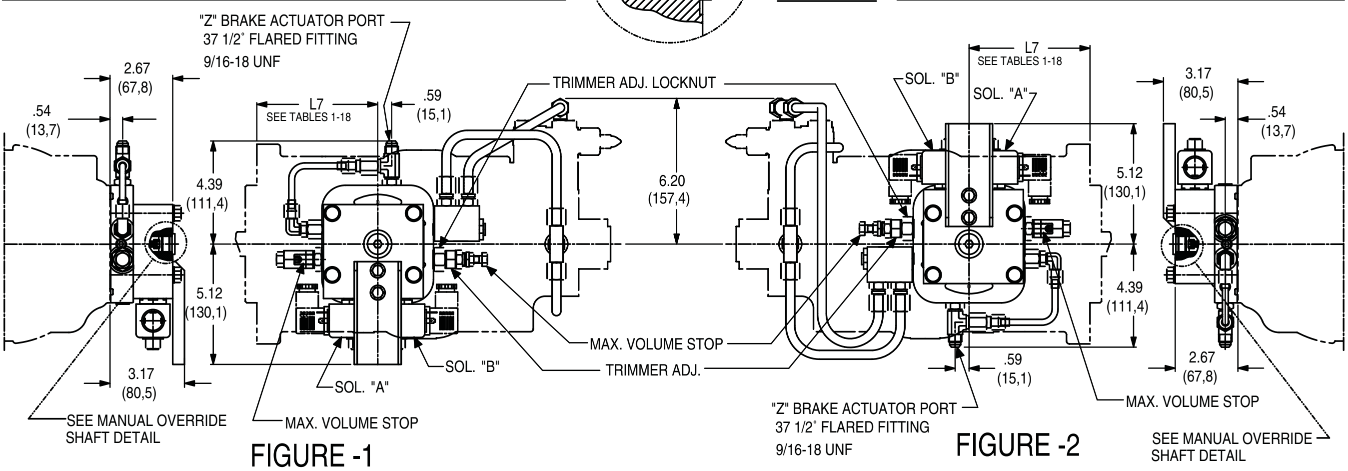
CONTROL SPRING OFF-SET TO MIN, VOLUME

CONTROL OPTION	FIG.	PUMP ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT:	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"8C*"	2	CW	"P2"	CW	INLET	OUTLET
	2	CCW	"P1"	CCW	INLET	OUTLET
	2	CW	"P1"	CCW	OUTLET	INLET
	2	CCW	"P2"	CW	OUTLET	INLET

-B- CONTROL MTG. POSITION						
CONTROL OPTION	FIG.	PUMP ROT.	ENERGIZE SOLENOID	MANUAL OVERRIDE SHAFT ROTATION	PORT "A"	PORT "B"
"9A*"	1	CW	"A"	CCW	INLET	OUTLET
	1	CCW	"B"	CW	INLET	OUTLET
	1	CW	"B"	CW	OUTLET	INLET
	1	CCW	"A"	CCW	OUTLET	INLET

-A- CONTROL MTG. POSITION						
CONTROL OPTION	FIG.	PUMP ROT.	ENERGIZE SOLENOID	MANUAL OVERRIDE SHAFT ROTATION	PORT "A"	PORT "B"
"9A*"	2	CW	"B"	CW	INLET	OUTLET
	2	CCW	"A"	CCW	INLET	OUTLET
	2	CW	"A"	CCW	OUTLET	INLET
	2	CCW	"B"	CW	OUTLET	INLET





-B- CONTROL MTG. POSITION						
CONTROL OPTION	FIG.	PUMP ROT.	ENERGIZE SOLENOID	MANUAL OVERRIDE SHAFT ROTATION	PORT "A"	PORT "B"
"9C*"	1	CW	"A"	CCW	INLET	OUTLET
	1	CCW	"B"	CW	INLET	OUTLET
	1	CW	"B"	CW	OUTLET	INLET
	1	CCW	"A"	CCW	OUTLET	INLET

-A- CONTROL MTG. POSITION						
CONTROL OPTION	FIG.	PUMP ROT.	ENERGIZE SOLENOID	MANUAL OVERRIDE SHAFT ROTATION	PORT "A"	PORT "B"
"9C*"	2	CW	"B"	CW	INLET	OUTLET
	2	CCW	"A"	CCW	INLET	OUTLET
	2	CW	"A"	CCW	OUTLET	INLET
	2	CCW	"B"	CW	OUTLET	INLET

-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "X"	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "Y"	PORT "A"
"2A*"	1	CW	REDUCED SPEED	FULL SPEED	INLET
	1	CCW			OUTLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "X"	PRESSURE SIGNAL TO: 1/8-27 N.P.T.F. PORT "Y"	PORT "A"
"2A*"	2	CW	FULL SPEED	REDUCED SPEED	INLET
	2	CCW			OUTLET

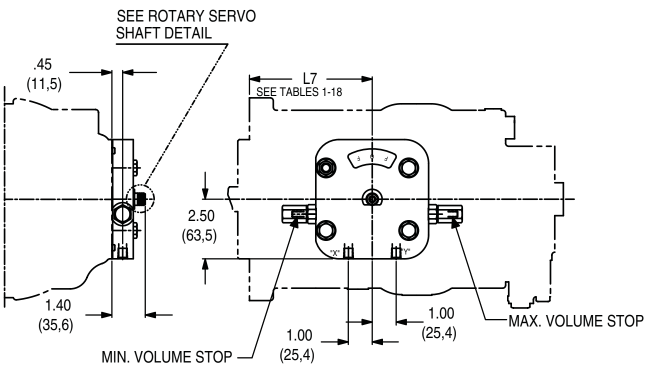


FIGURE -1

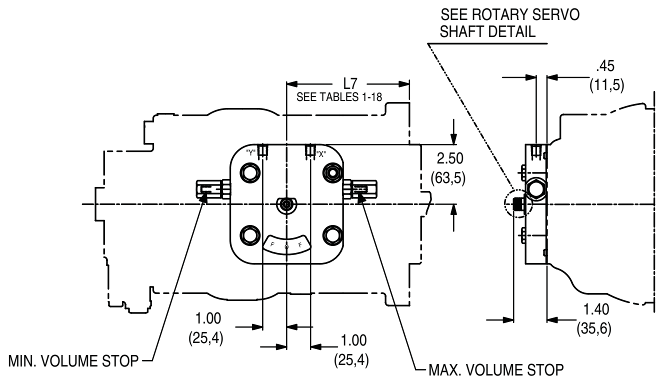
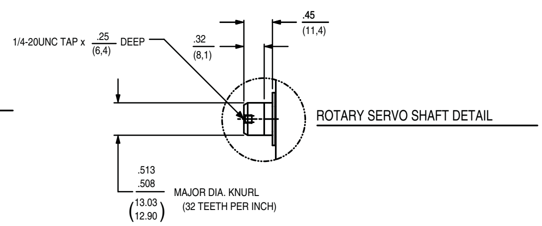


FIGURE -2



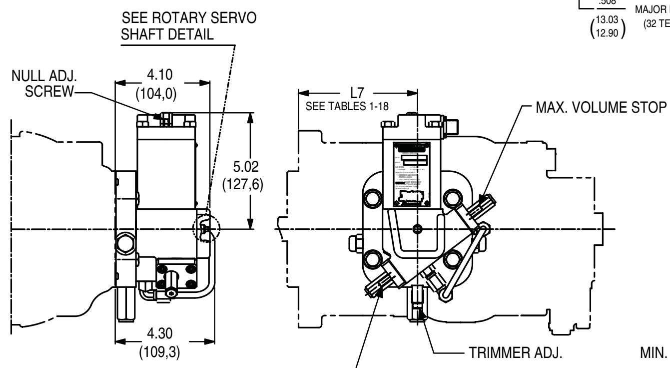


FIGURE -1

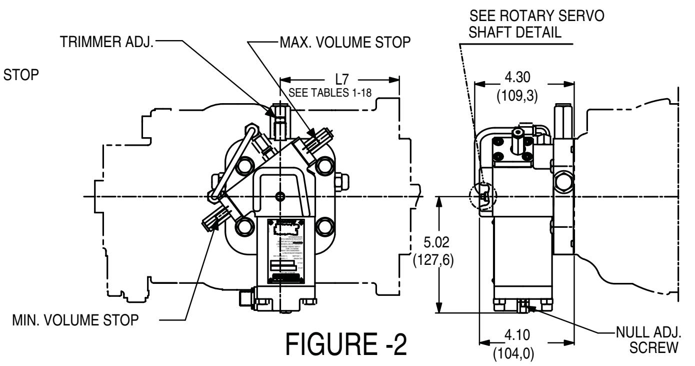


FIGURE -2

-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	ROTARY SERVO INPUT SHAFT CCW ROTATION	ROTARY SERVO INPUT SHAFT CW ROTATION	PORT "A"	PORT "B"
"5A*"	1	CW	REDUCED SPEED	FULL SPEED	INLET	OUTLET
	1	CCW			OUTLET	INLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	ROTARY SERVO INPUT SHAFT CCW ROTATION	ROTARY SERVO INPUT SHAFT CW ROTATION	PORT "A"	PORT "B"
"5A*"	2	CW	FULL SPEED	REDUCED SPEED	INLET	OUTLET
	2	CCW			OUTLET	INLET

-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT P2	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"8A*"	1	CW	FULL SPEED	CW	INLET	OUTLET
	1	CCW		CW	OUTLET	INLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	PRESSURE SIGNAL TO SAE-4 STR. THD. PORT P1	ROTARY SERVO INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"8A*"	2	CW	FULL SPEED	CCW	INLET	OUTLET
	2	CCW		CCW	OUTLET	INLET

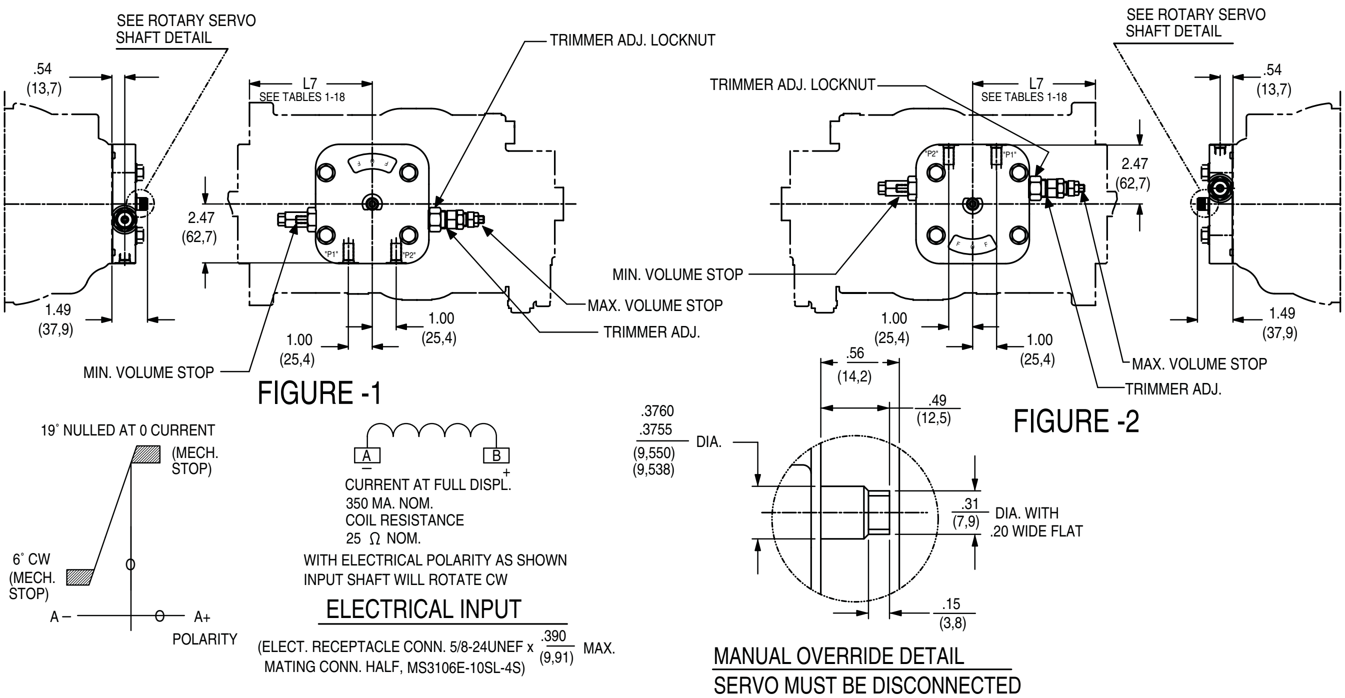


FIGURE -1

FIGURE -2

-B- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	ENERGIZE SOLENOID	MANUAL OVERRIDE SHAFT ROTATION	PORT "A"	PORT "B"
"9A*"	1	CW	FULL SPEED	CW	INLET	OUTLET
	1	CCW		CW	OUTLET	INLET

-A- CONTROL MTG. POSITION

CONTROL SPRING OFF-SET TO FULL VOLUME

CONTROL OPTION	FIG.	MOTOR ROT.	ENERGIZE SOLENOID	MANUAL OVERRIDE SHAFT ROTATION	PORT "A"	PORT "B"
"9A*"	2	CW	FULL SPEED	CCW	INLET	OUTLET
	2	CCW		CCW	OUTLET	INLET

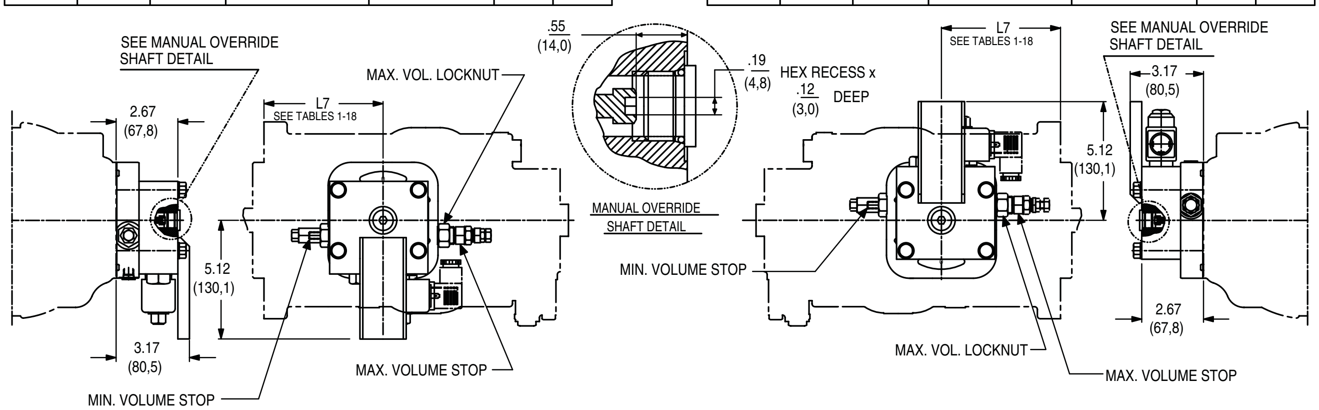


FIGURE -1

FIGURE -2

-A- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	INPUT SHAFT ROTATION	PORT "A"	PORT "B"	TORQUE LIMITER ADJ.
"**4"	3	CW	CW	INLET	OUTLET	E
	1	CCW	CCW	INLET	OUTLET	F
	1	CCW	CW	OUTLET	INLET	E
	3	CW	CCW	OUTLET	INLET	F

SERIES SIZE	L7	L10	L11
6, 7 & 8 (SAE 127-2)	5.15 (130,9)	6.20 (157,4)	6.48 (164,5)
6, 7 & 8 (SAE 152-4)	6.49 (164,8)		
11 & 14	6.38 (162,0)	5.83 (148,0)	5.83 (148,0)
24 & 30	8.14 (206,7)	7.15 (181,6)	7.15 (181,6)

-B- CONTROL MTG. POSITION

CONTROL OPTION	FIG.	PUMP ROT.	INPUT SHAFT ROTATION	PORT "A"	PORT "B"	TORQUE LIMITER ADJ.
"**4"	4	CW	CCW	INLET	OUTLET	F
	2	CCW	CW	INLET	OUTLET	E
	2	CCW	CCW	OUTLET	INLET	F
	4	CW	CW	OUTLET	INLET	E

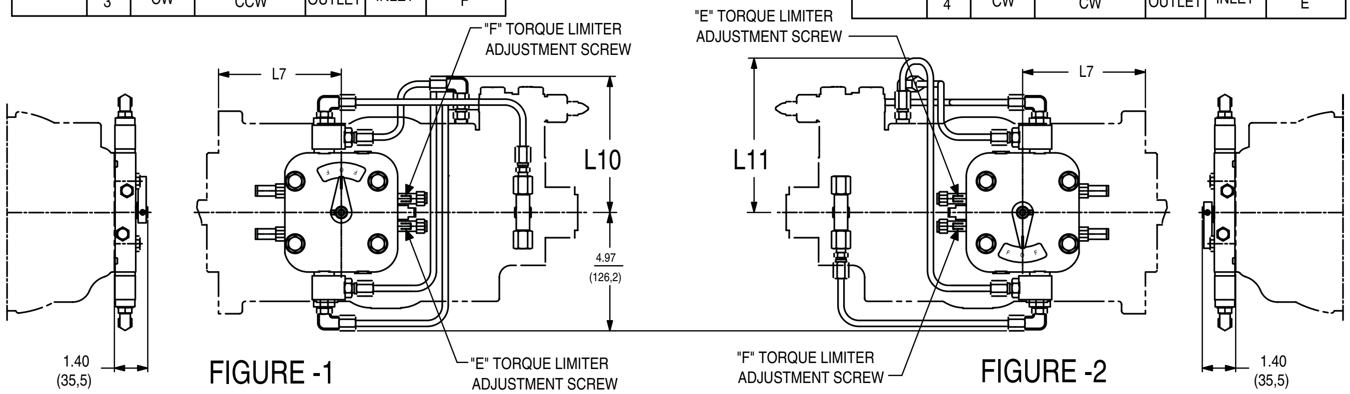


FIGURE -1

FIGURE -2

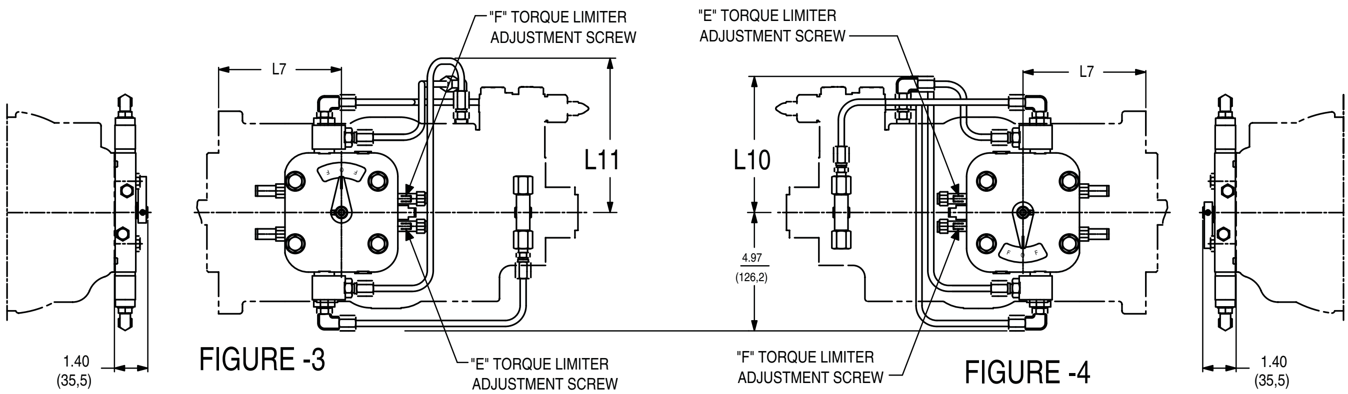


FIGURE -3

FIGURE -4

-A- CONTROL MTG. POSITION					
CONTROL OPTION	FIG.	PUMP ROT.	INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"**6" or "**8"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET

-B- CONTROL MTG. POSITION					
CONTROL OPTION	FIG.	PUMP ROT.	INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"**6" or "**8"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

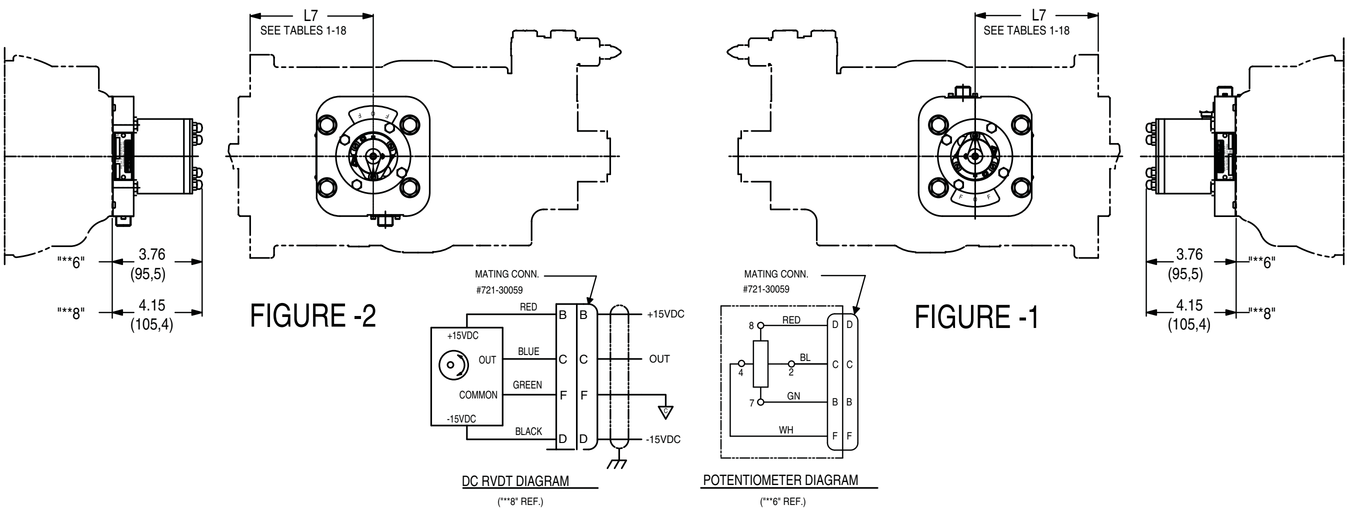


FIGURE -2

FIGURE -1

-A- CONTROL MTG. POSITION					
CONTROL OPTION	FIG.	PUMP ROT.	INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"**2"	2	CW	CW	INLET	OUTLET
	2	CCW	CCW	INLET	OUTLET
	2	CW	CCW	OUTLET	INLET
	2	CCW	CW	OUTLET	INLET

-B- CONTROL MTG. POSITION					
CONTROL OPTION	FIG.	PUMP ROT.	INPUT SHAFT ROTATION	PORT "A"	PORT "B"
"**2"	1	CW	CCW	INLET	OUTLET
	1	CCW	CW	INLET	OUTLET
	1	CW	CW	OUTLET	INLET
	1	CCW	CCW	OUTLET	INLET

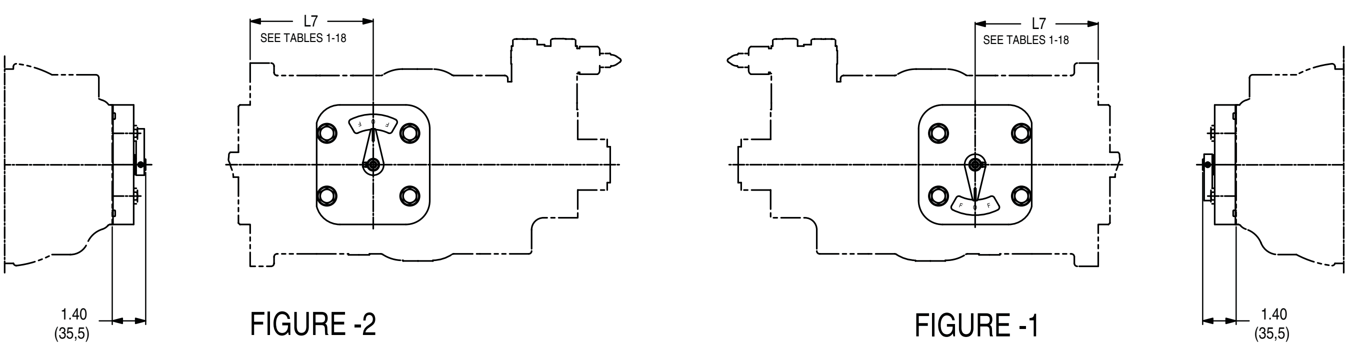


FIGURE -2

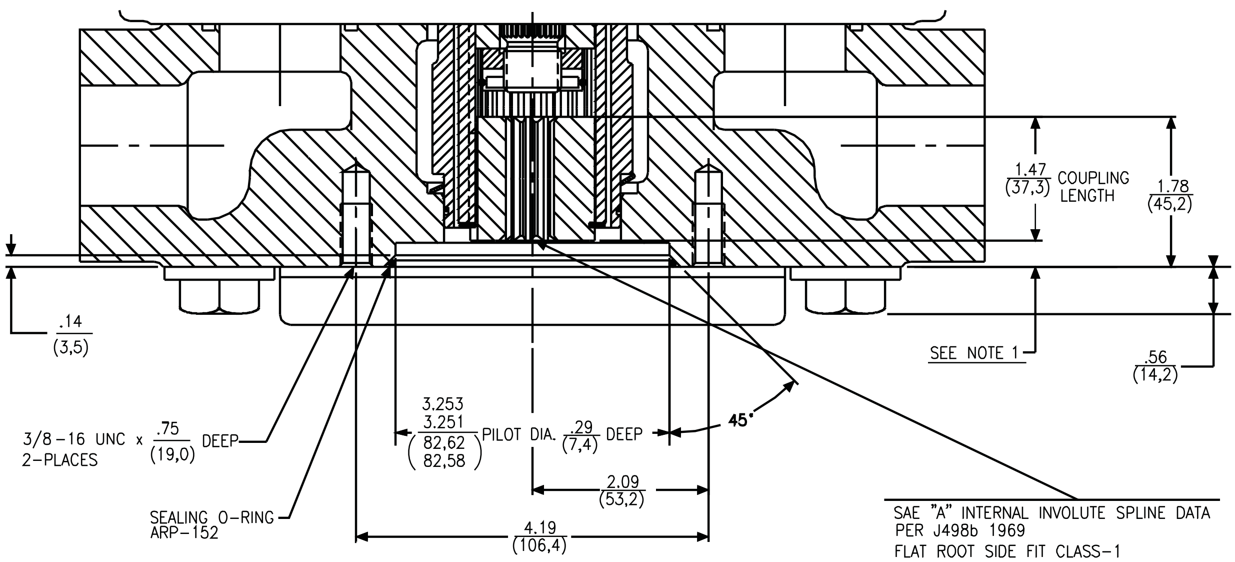
FIGURE -1

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

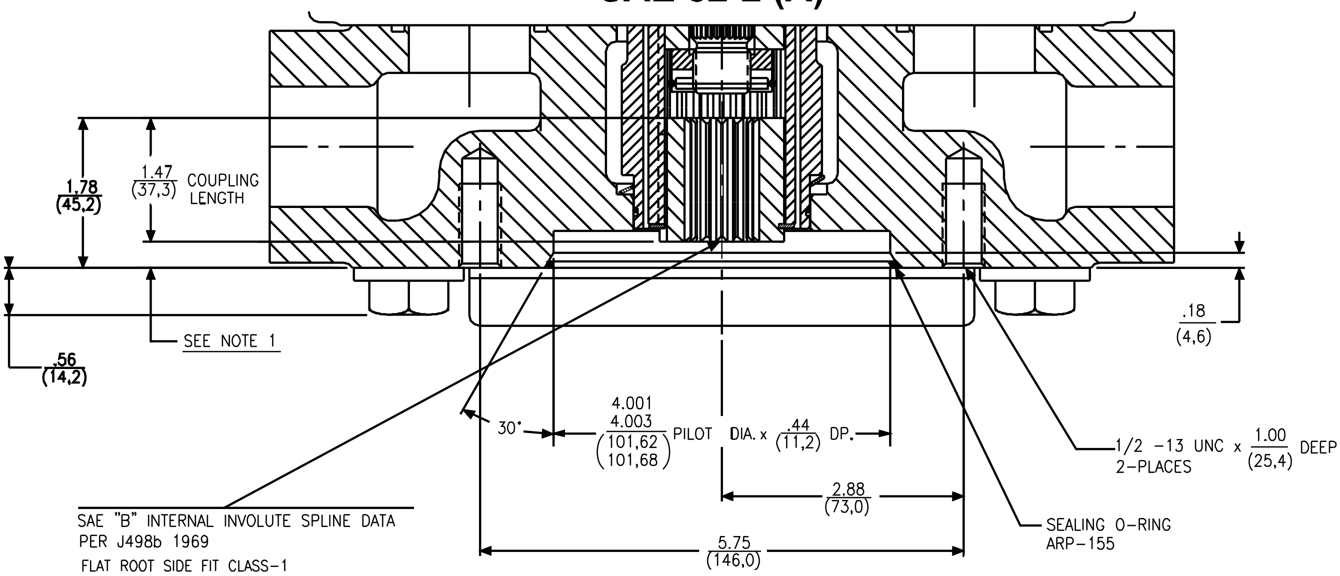
		SAE Mounting and Coupling								
	Mounting	**Blanking Plate**	**82-2 (A)**	**101-2 (B)**	**101-4 (B)**	**127-2 (C)**	**127-4 (C)**	**152-4 (D)**	**165-4 (E)**	**177-4 (F)**
	Coupling	**None**	**16-4 (A)**	**22-4 (B)**	**22-4 (B)**	**32-4 (C)**	**32-4 (C)**	**44-4 (D)**	**44-4 (E)**	**50-4 (F)**
Pumps	**P6/7/8 S, X**	M	A	B	-	-	-	-	-	-
	P6/7/8 R, L , M	M	A	B	-	C	-	-	-	-
	P11/14 S, X	M	A	B	-	-	-	-	-	-
	P11/14 R, L, M	M	A	B	B	C	C	D	E	
	P24/30 S, X	-	-	B	-	C	-	-	-	-
	P24/30 R, L, M	M	-	B	B	C	C	D	E	F
Motors	**M6/7/8 R, L, M, N**	M	A	B	-	C	-	-	-	-
	M11/14 R, L, M, N	M	A	B	B	C	C	D	E	-
	M24/30 R, L, M, N	M	-	B	B	C	C	D	E	F

P6-14 S,X
SAE 82-2 (A) WITH COUPLING 16-4
SAE 101-2 (B) WITH COUPLING 22-4

NOTE:
1. REAR AUXILIARY UNIT TO LIMIT COUPLING TRAVEL .28(7.1) MINIMUM FROM MOUNTING FACE (SAE STD. REF.)

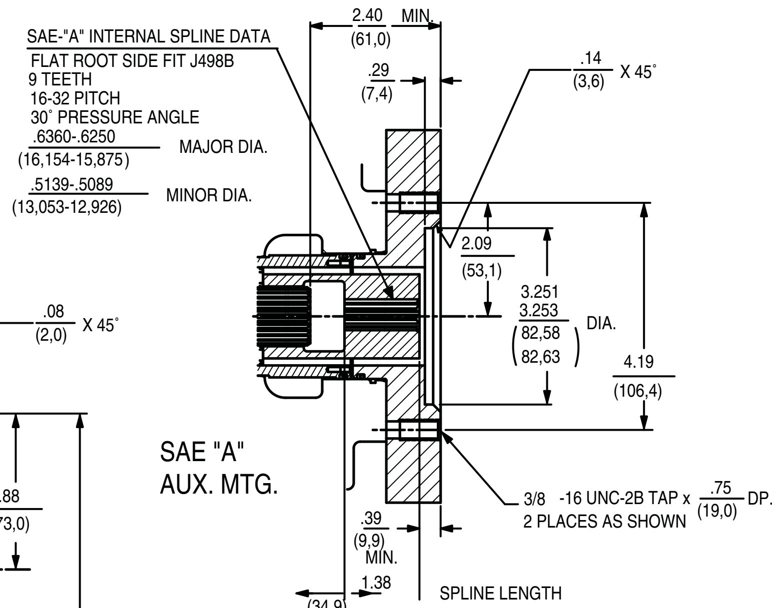


SAE 82-2 (A)

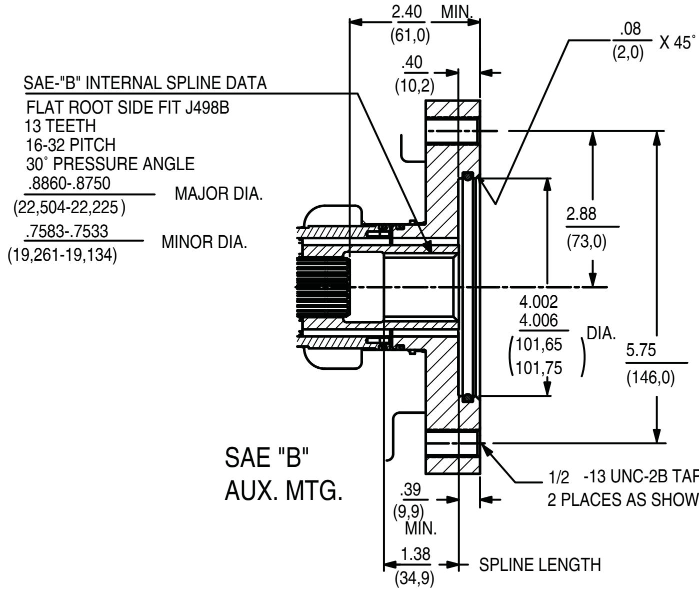


SAE 101-2 (B)

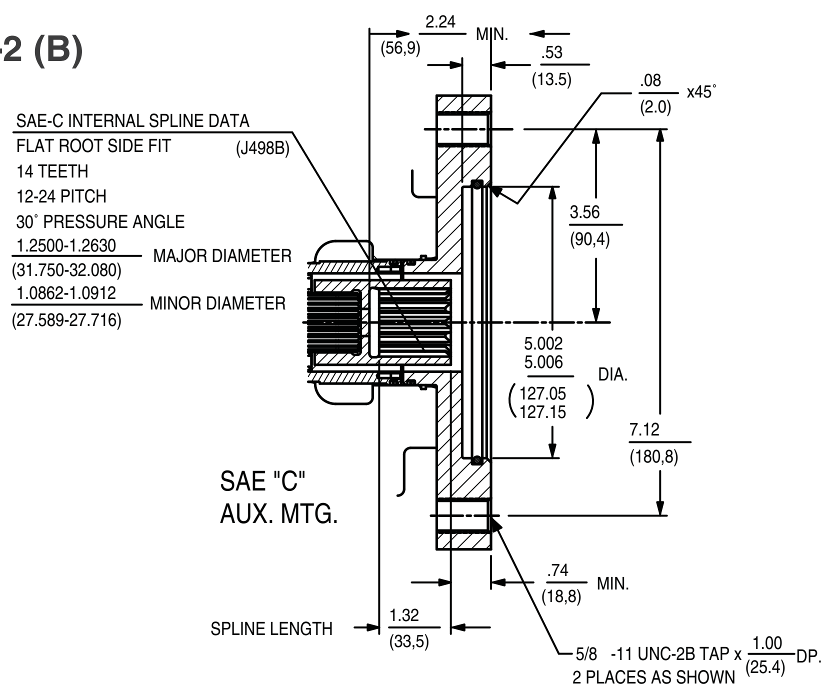
M6,7 R,L,M,N
P6,7,8 R,L,M
SAE 127-2 (C) WITH COUPLING 32-4
SAE 101-2 (B) WITH COUPLING 22-4
SAE 82-2 (A) WITH COUPLING 16-4



SAE 82-2 (A)

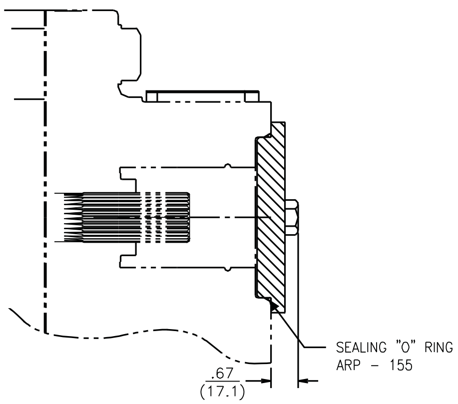


SAE 101-2 (B)

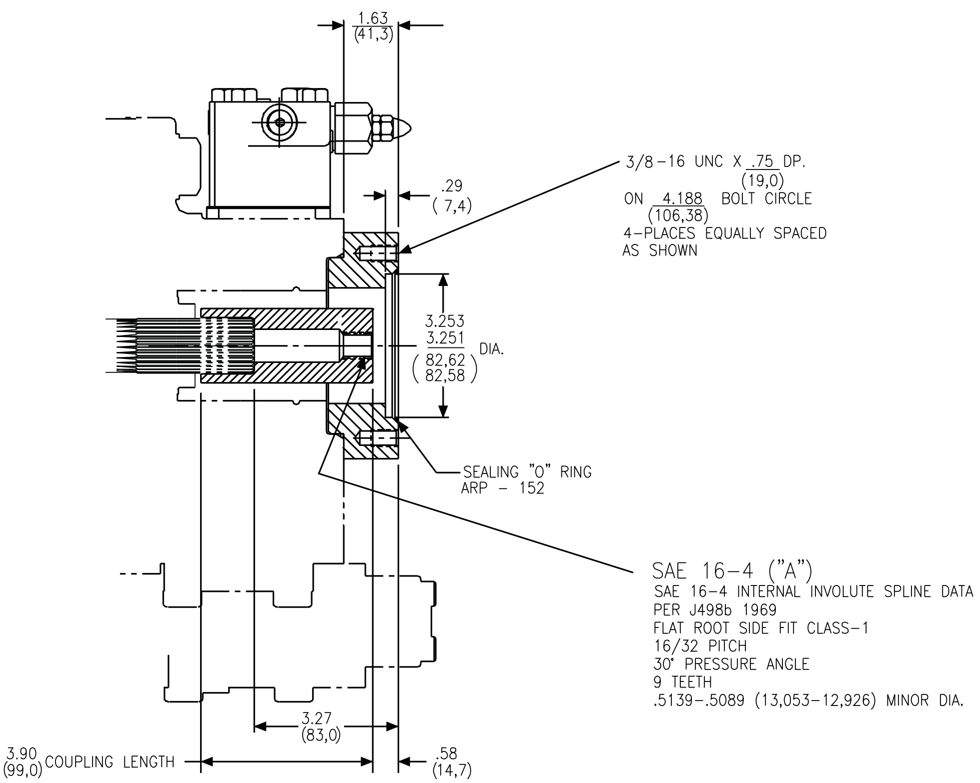


SAE 127-2 (C)

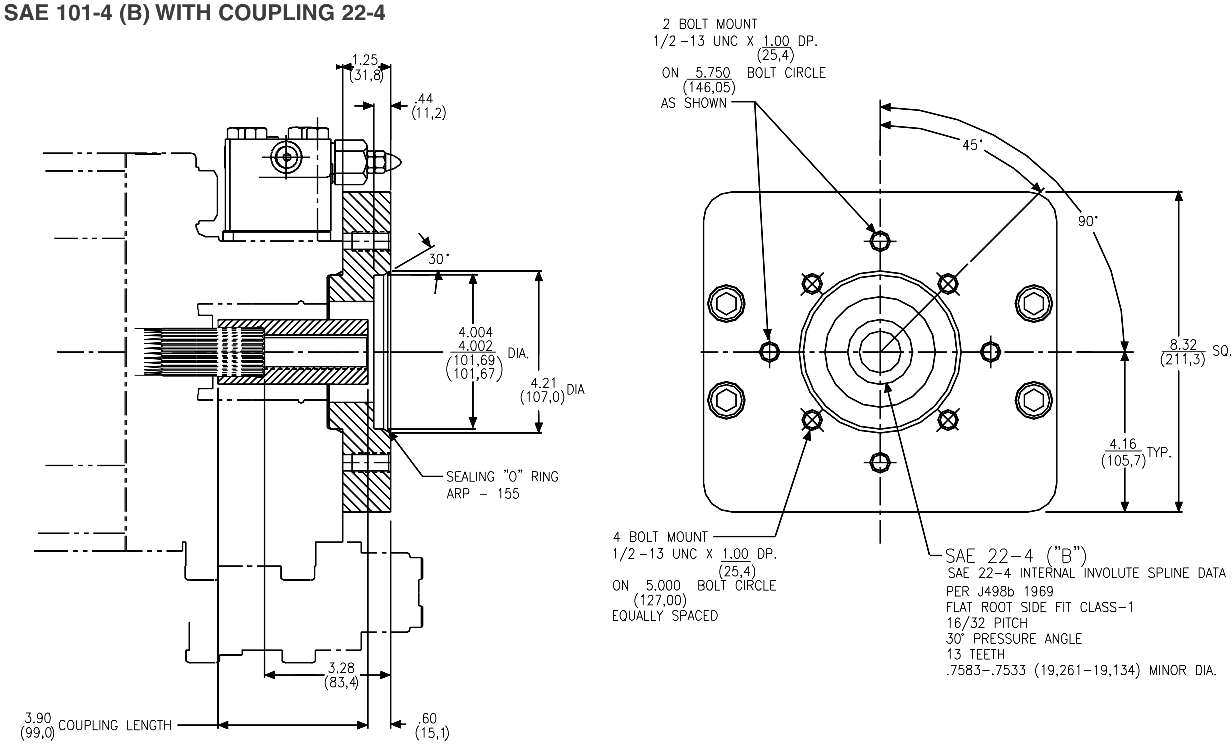
M11,14 R,L,M,N
P11,14 R,L
BLANKING PLATE



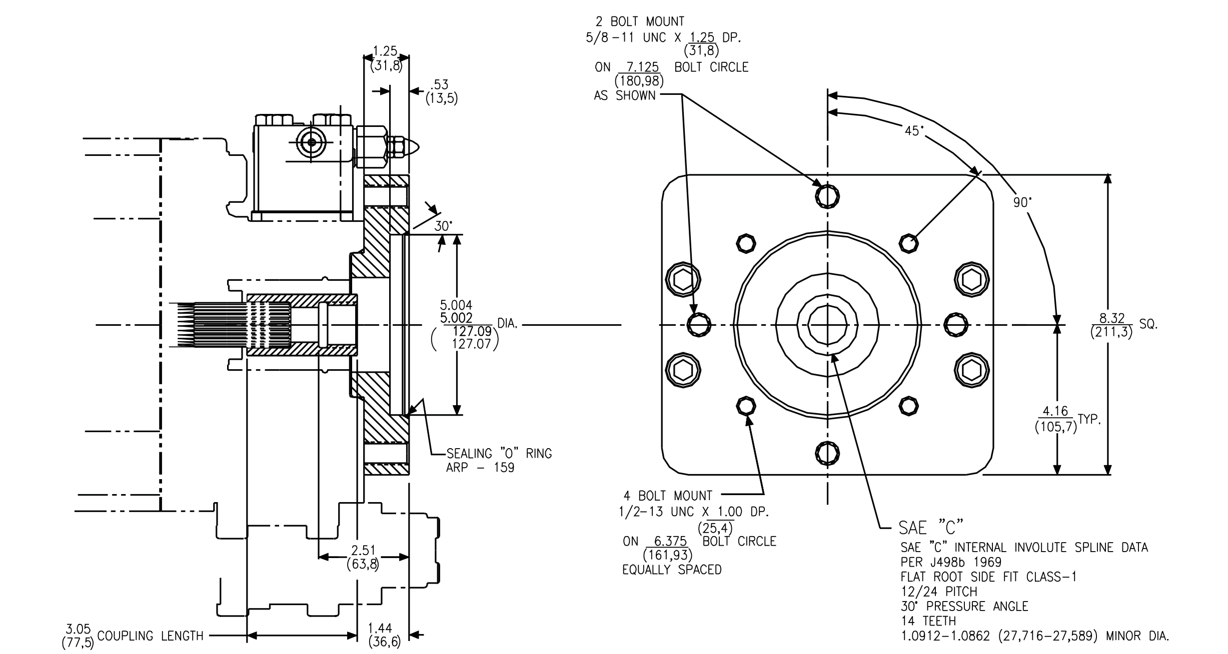
M11,14 R,L,M,N
P11,14 R,L,M
SAE 82-2 (A) WITH COUPLING 16-4



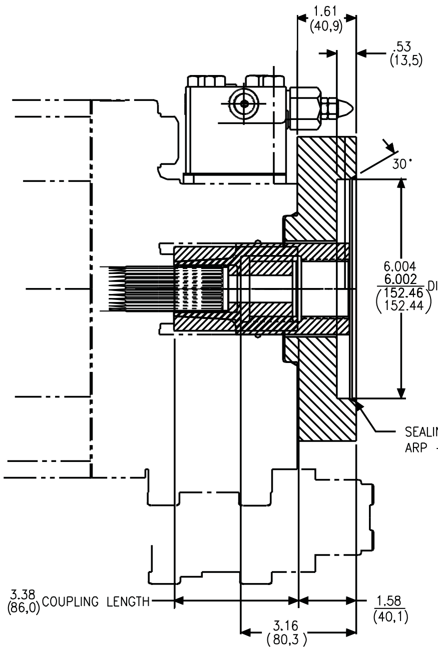
M11,14 R,L,M,N
P11,14 R,L,M
SAE 101-2 (B) WITH COUPLING 22-4
SAE 101-4 (B) WITH COUPLING 22-4

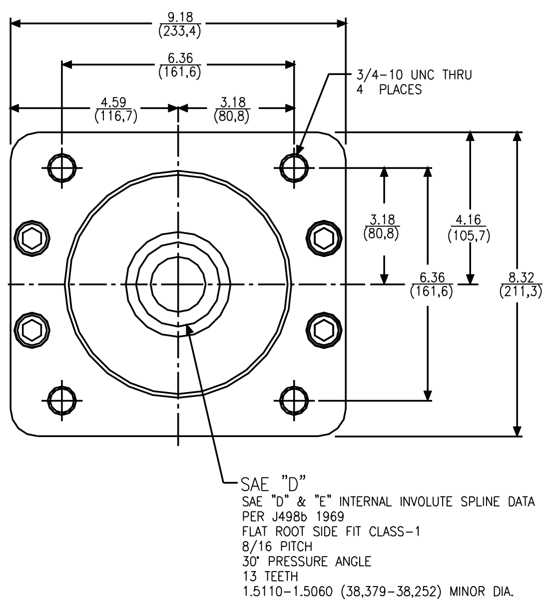


M11,14 R,L,M,N
P11,14 R,L,M
SAE 127-2 (C) WITH COUPLING 32-4
SAE 127-4 (C) WITH COUPLING 32-4

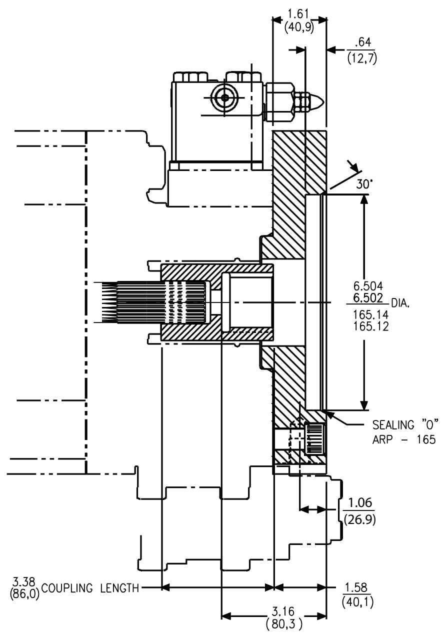


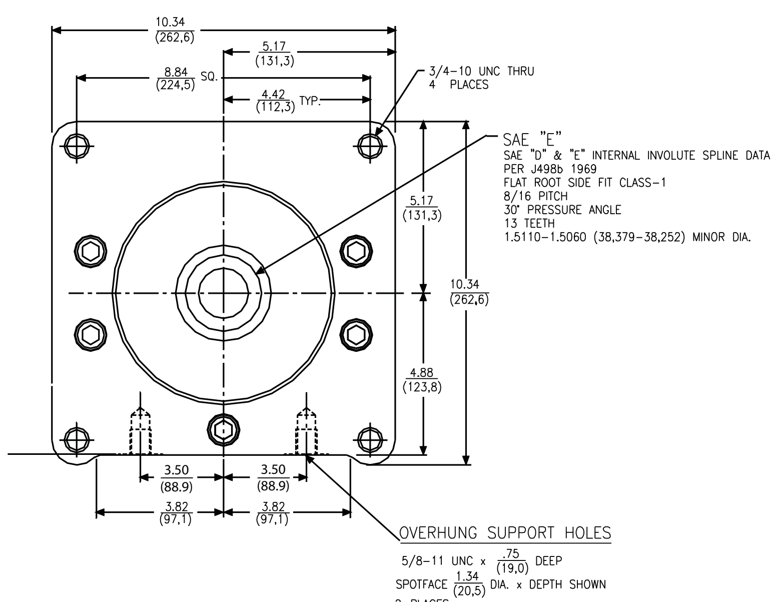
M11,14 R,L,M,N
P11,14 R,L,M
SAE 152-4 (D) WITH COUPLING 44-4



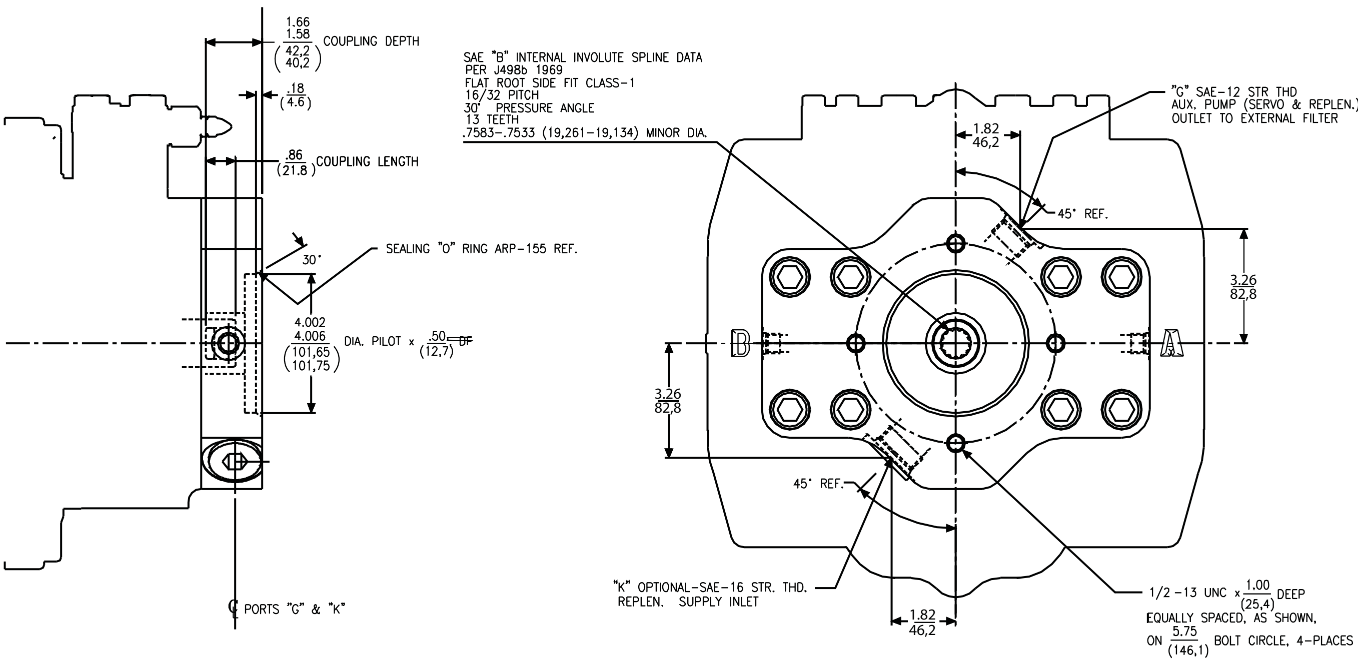


M11,14 R,L,M,N
P11,14 R,L,M
SAE 165-4 (E) WITH COUPLING 44-4

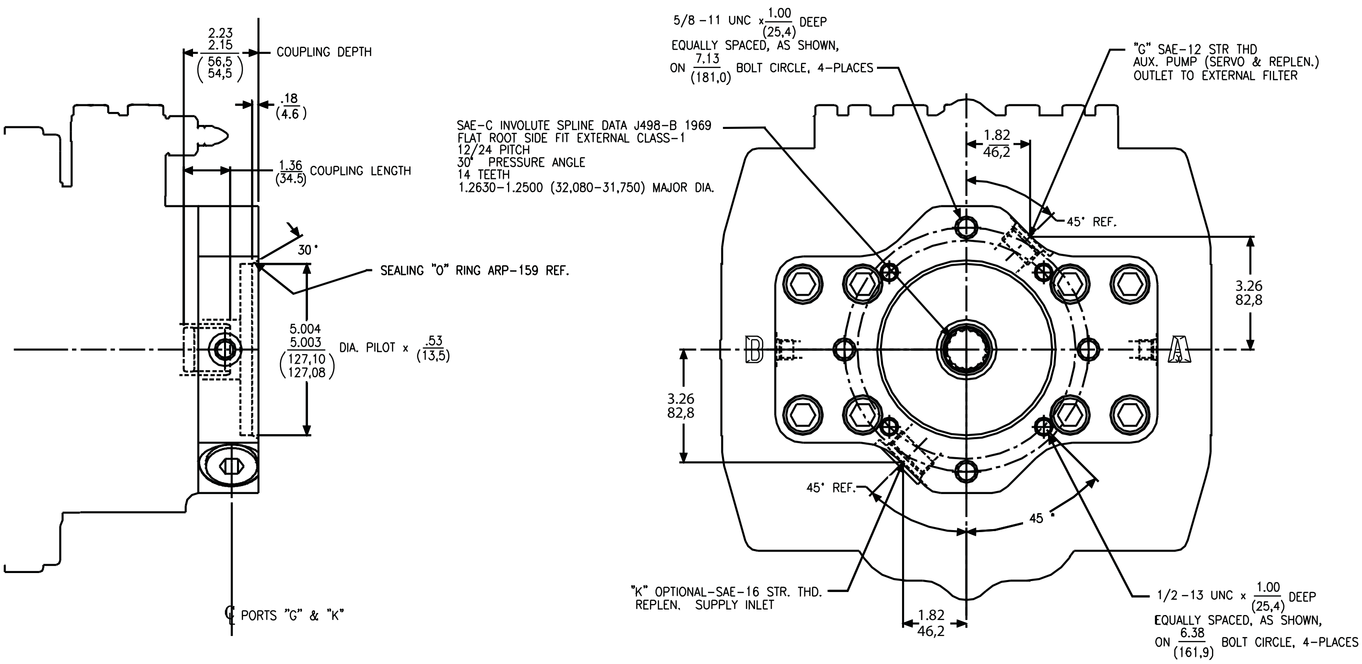




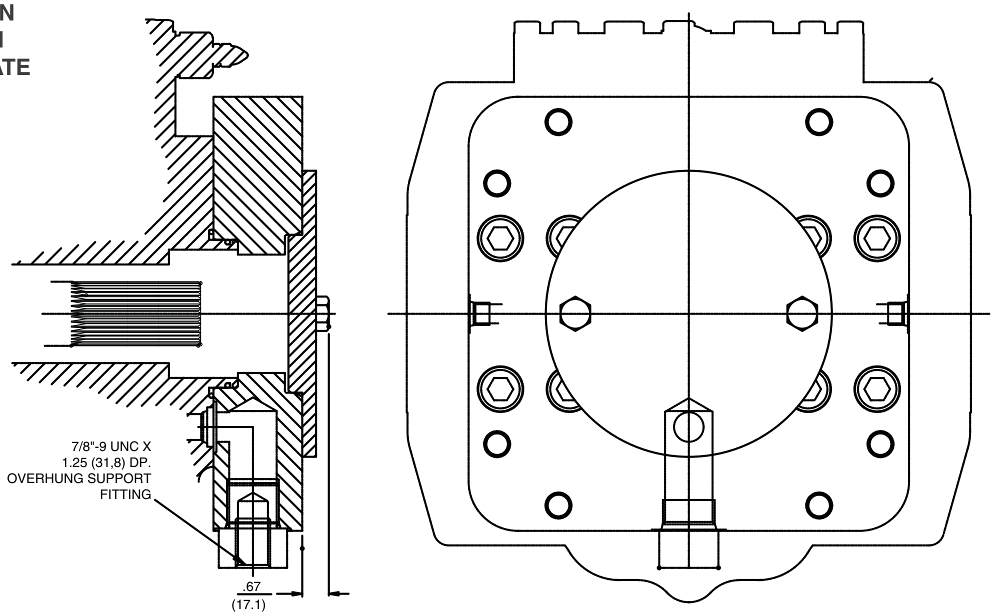
P24,30,S,X
SAE 101-2 (B) WITH COUPLING 22-4



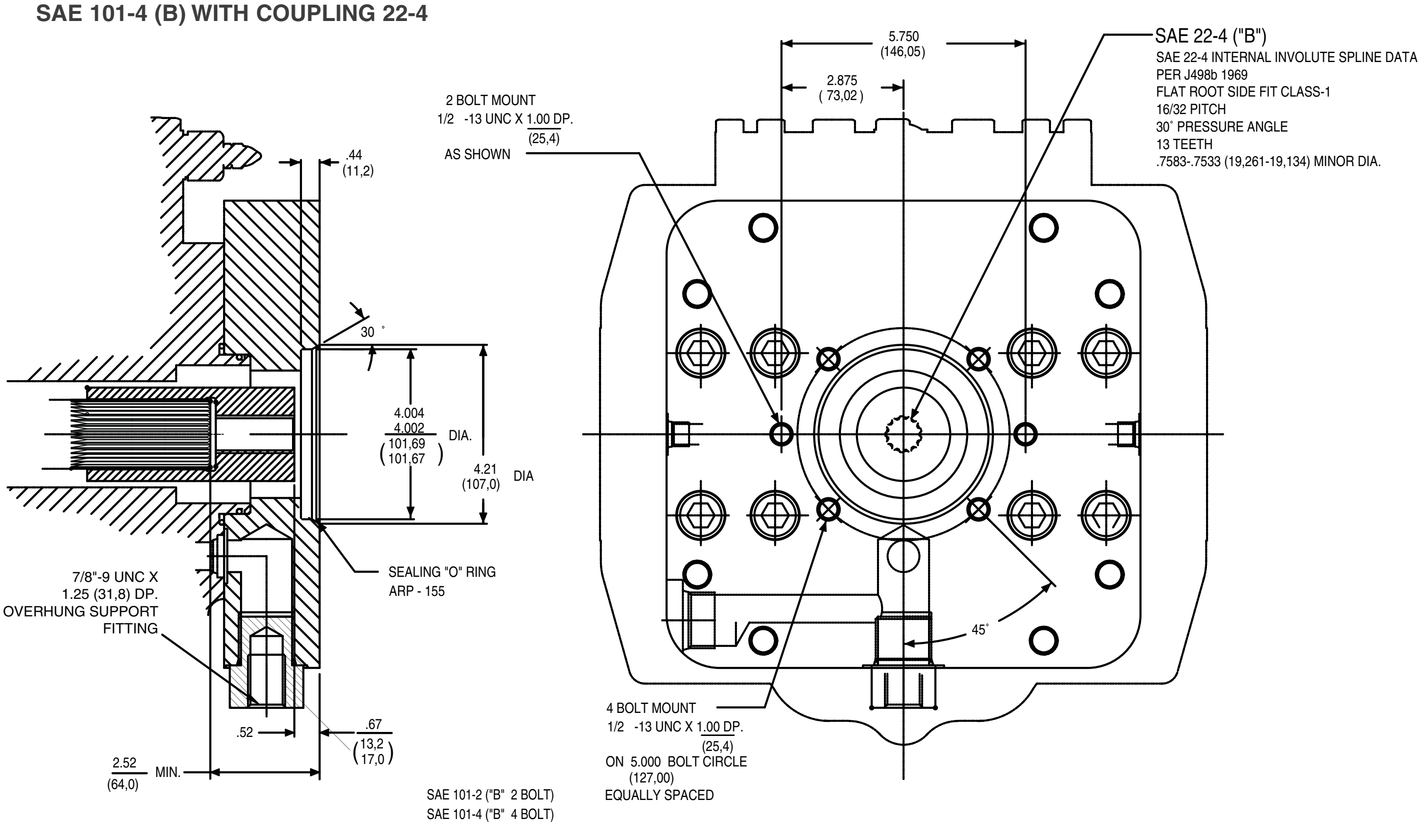
P24,30,S,X
SAE 127-2 (C) WITH COUPLING 32-4
SAE 127-4 (C) WITH COUPLING 32-4



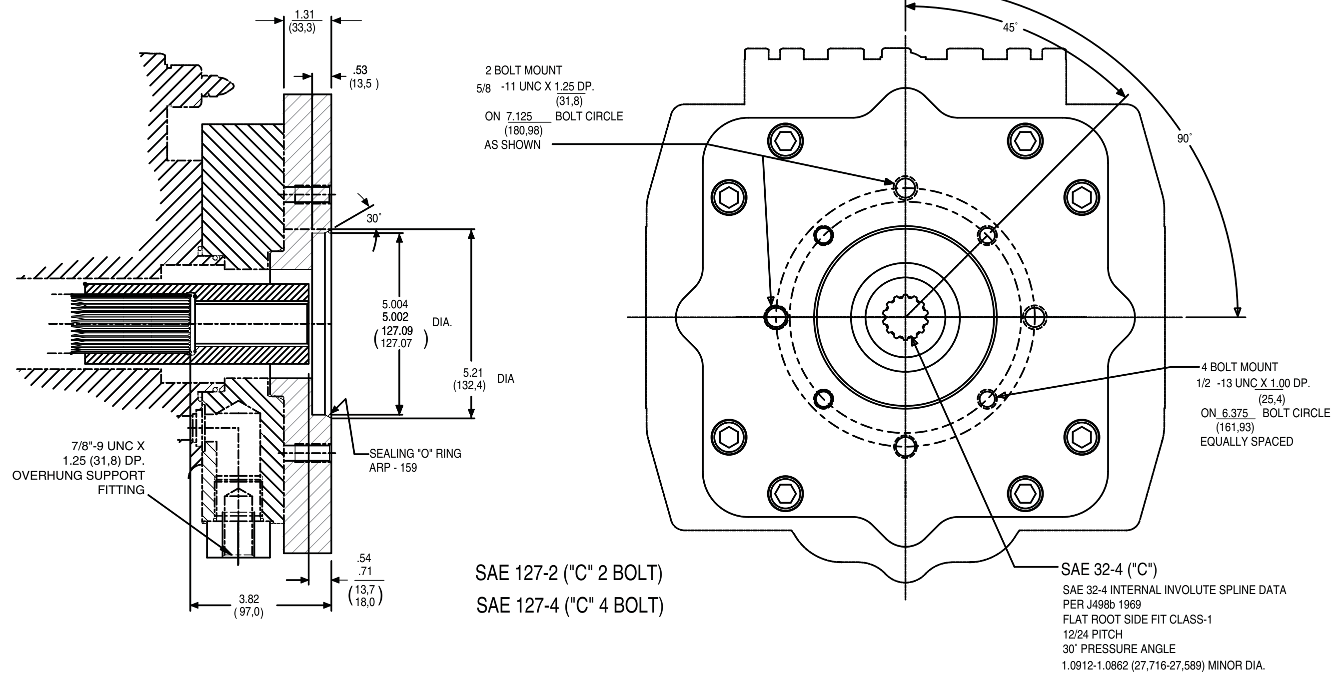
M24,30 R,L,M,N
P24,30 R,L,M
BLANKING PLATE



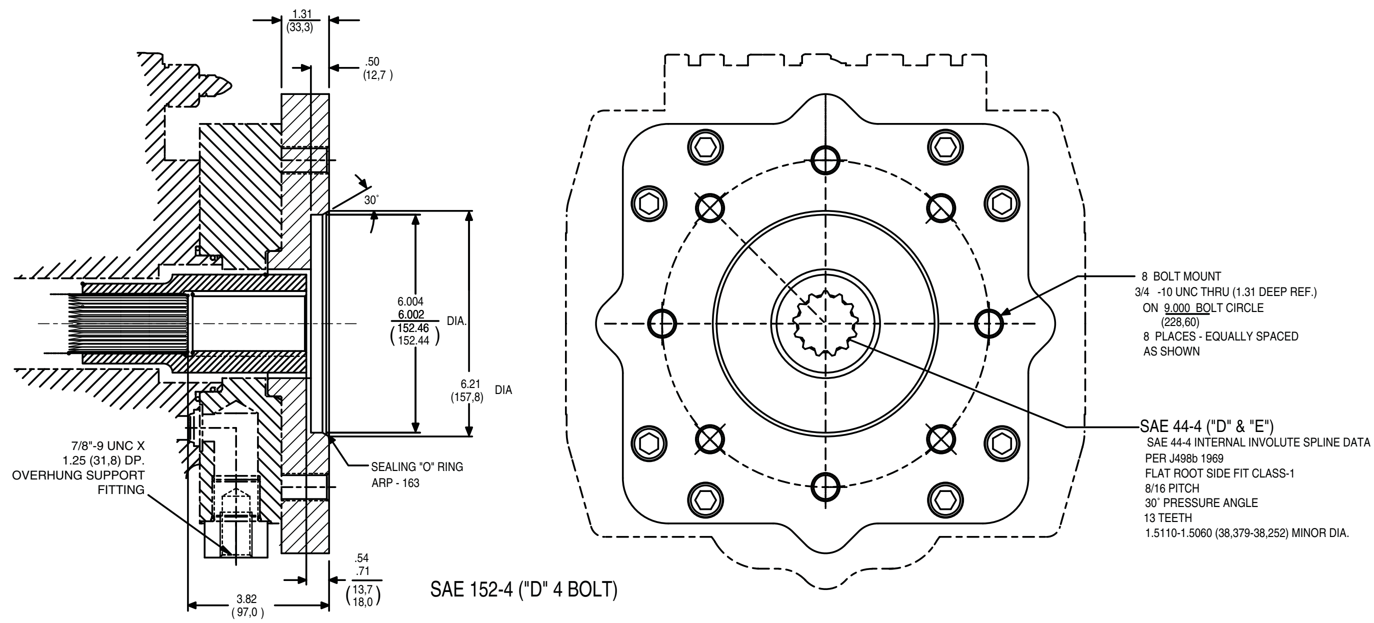
M24,30 R,L,M,N
P24,30 R,L,M
SAE 101-2 (B) WITH COUPLING 22-4
SAE 101-4 (B) WITH COUPLING 22-4



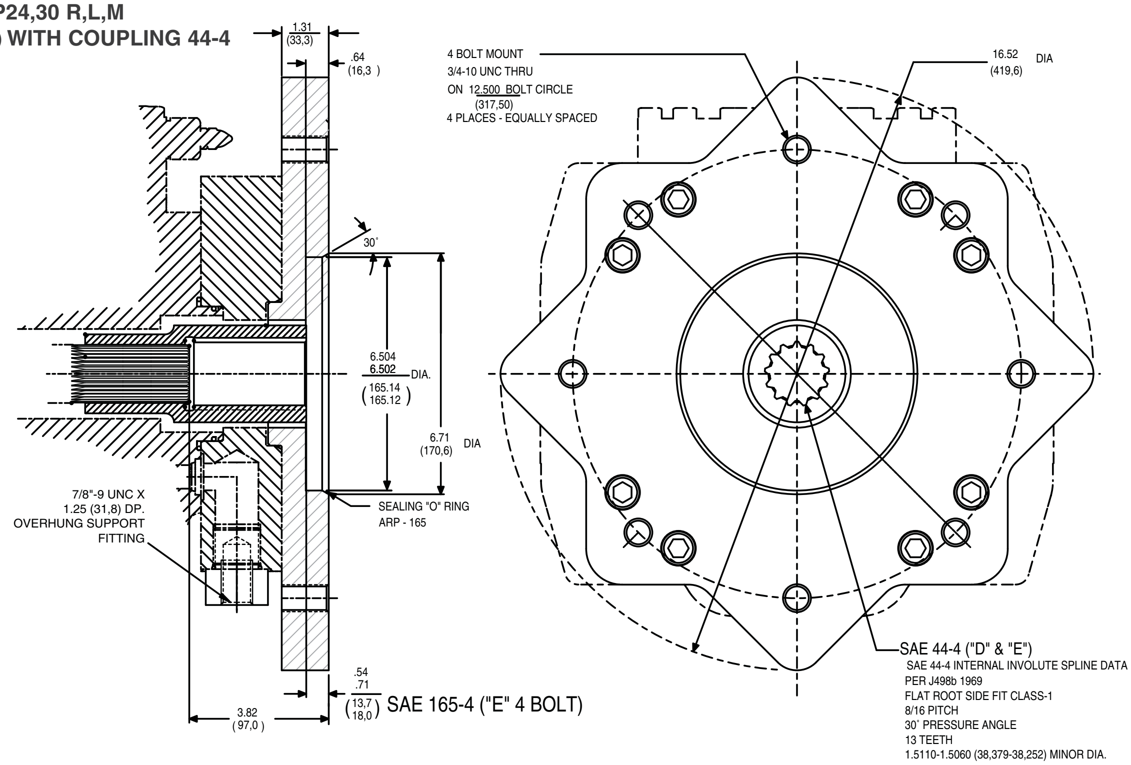
M24,30 R,L,M,N
P24,30 R,L,M
SAE 127-2 (C) WITH COUPLING 32-4
SAE 127-4 (C) WITH COUPLING 32-4



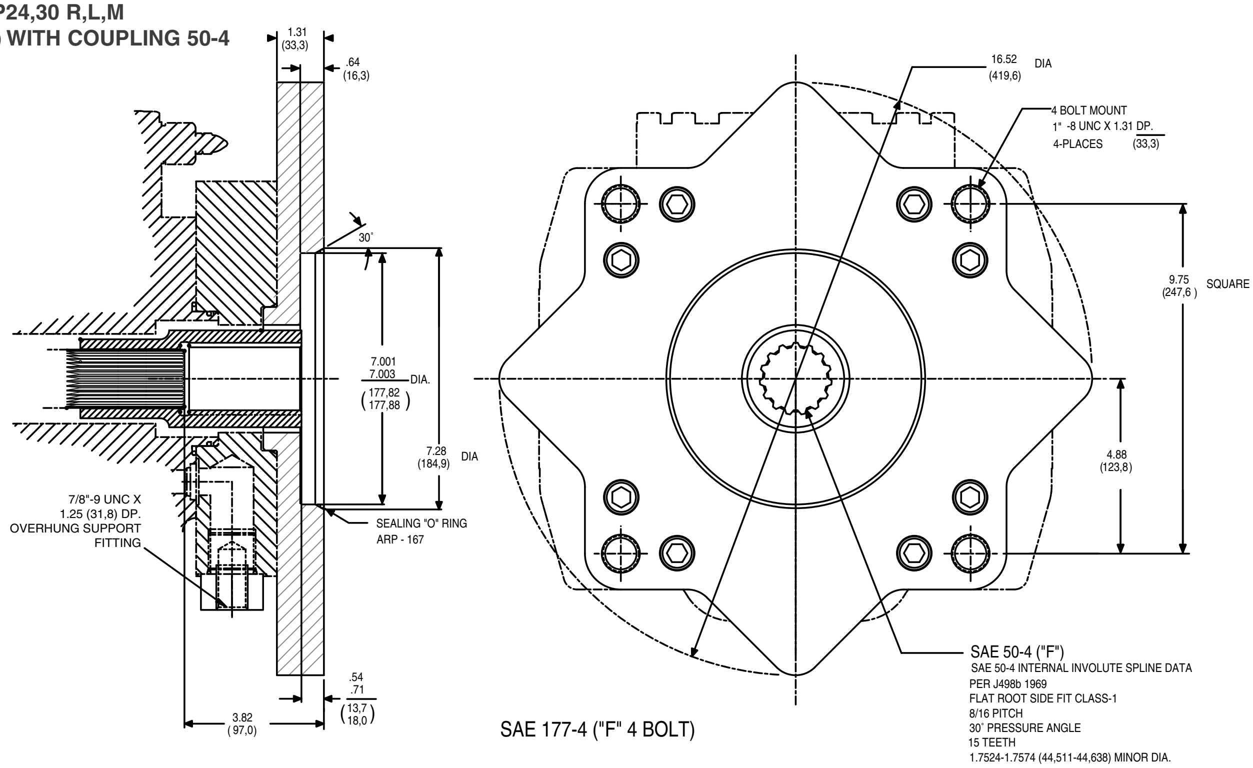
M24,30 R,L,M,N
P24,30 R,L,M
SAE 152-4 (D) WITH COUPLING 44-4

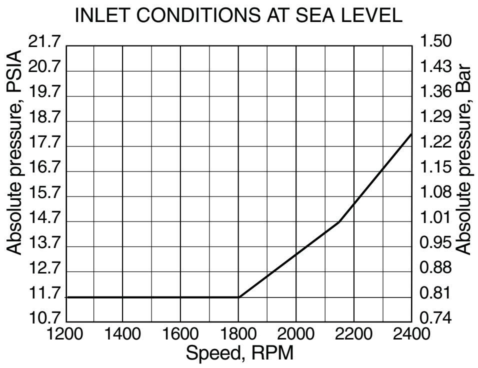


M24,30 R,L,M,N
P24,30 R,L,M
SAE 165-4 (E) WITH COUPLING 44-4

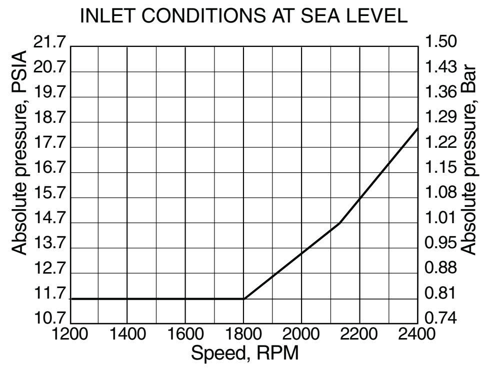


M24,30 R,L,M,N
P24,30 R,L,M
SAE 177-4 (F) WITH COUPLING 50-4

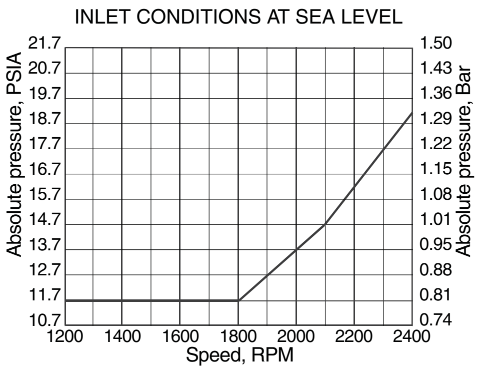




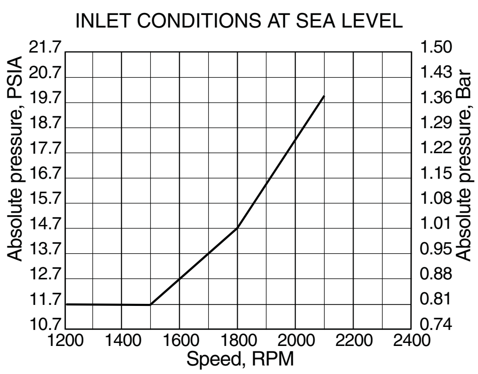
P6V & P6F



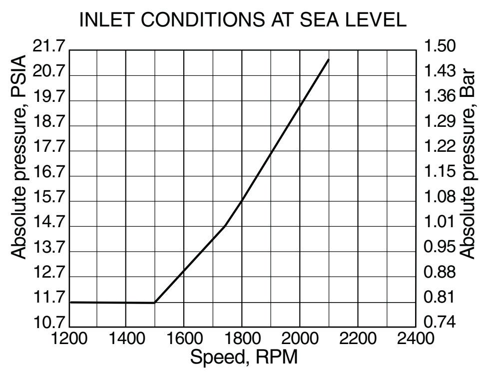
P7V & P7F



P8V & P8F



P11V



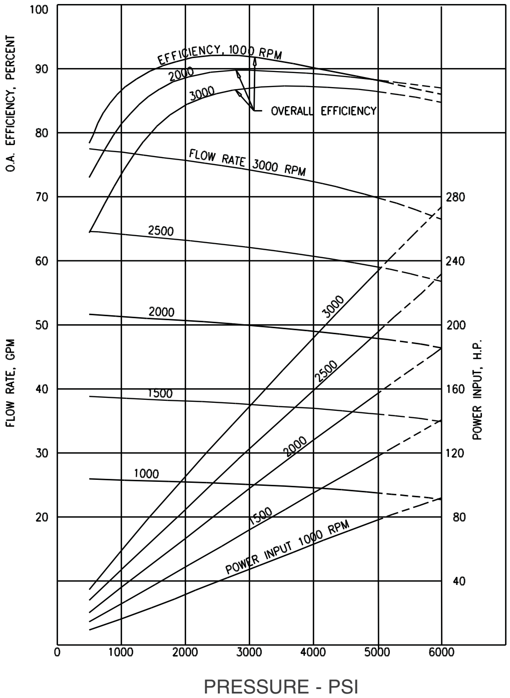
P14V

Note: The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec. A coarse screen may be considered in the suction line, no filter. For water in oil invert emulsions and water glycols increase the inlet absolute pressure by 25%, for phosphate ester increase the absolute inlet pressure by 35%. Any inlet pressures above atmospheric may increase noise levels and decrease efficiencies noted in this literature. Please consult your nearest Parker Office for further details.

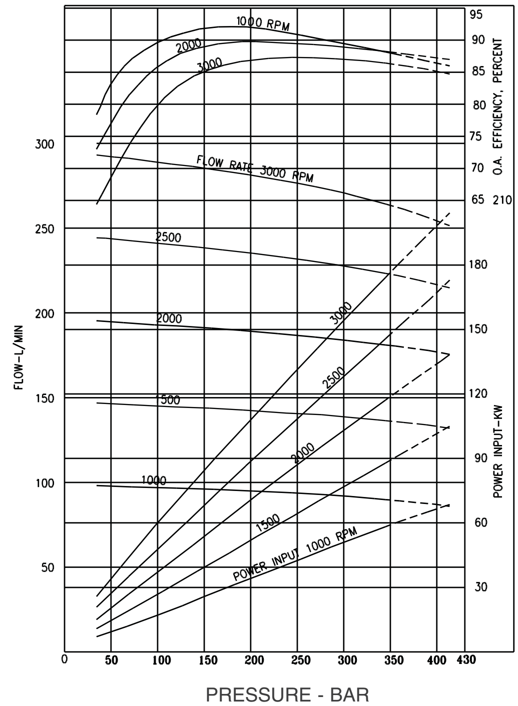
Inlet characteristics-auxiliary pump, port C

Series	Speed	Displacement		Pressure absolute	
	rpm	in^3/rev	cm^3/rev	psi	bar
6, 7, 8, 11, 14	1200	1.07	17,5	9.5	0,66
6, 7, 8, 11, 14	1800	1.07	17,5	9.5	0,66
6, 7, 8, 11, 14	2400	1.07	17,5	10.5	0,72
24, 30	1200	4.84	79,3	9.5	0,66
24, 30	1800	4.84	79,3	10.5	0,72

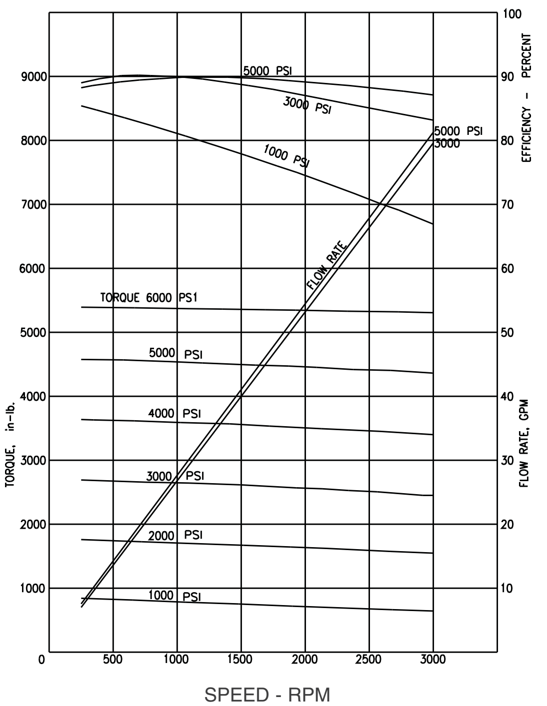
Note: Maximum pressure on inlet port C is 200 psi, 14 bar.



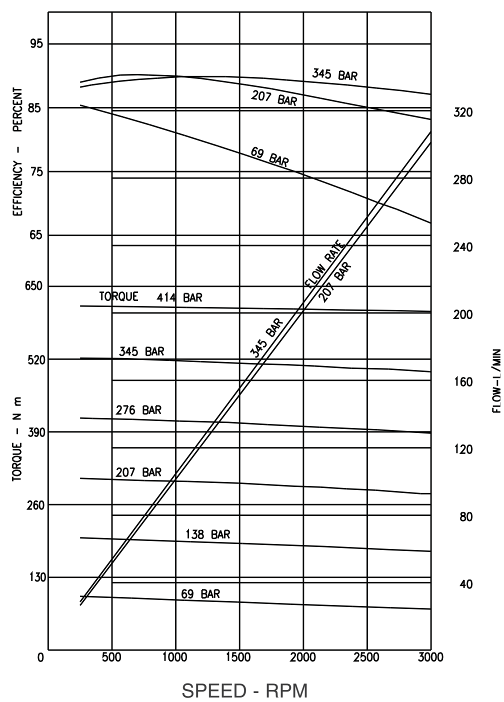
Performance curves Series 6
Pump at full displacement



Performance curves Series 6
Pump at full displacement

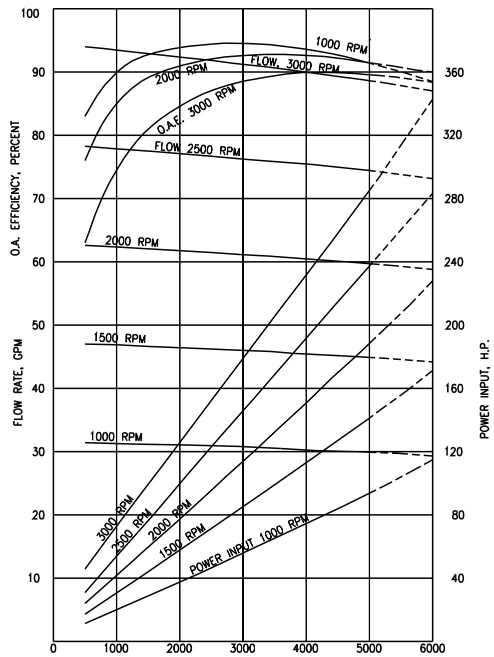


Performance curves Series 6
Motor at full displacement



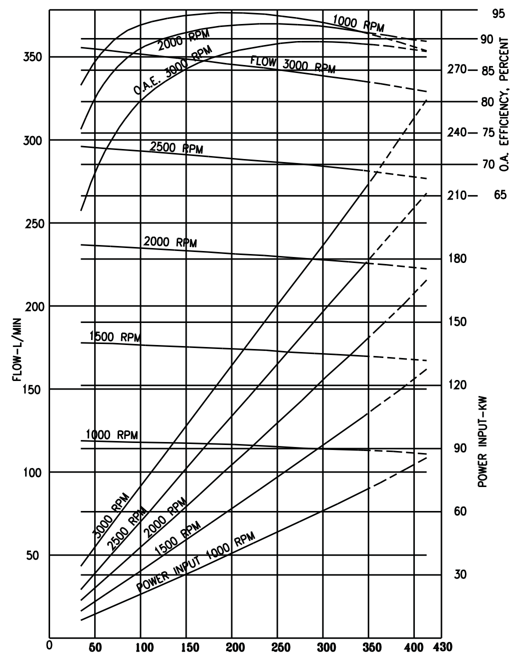
Performance curves Series 6
Motor at full displacement

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA



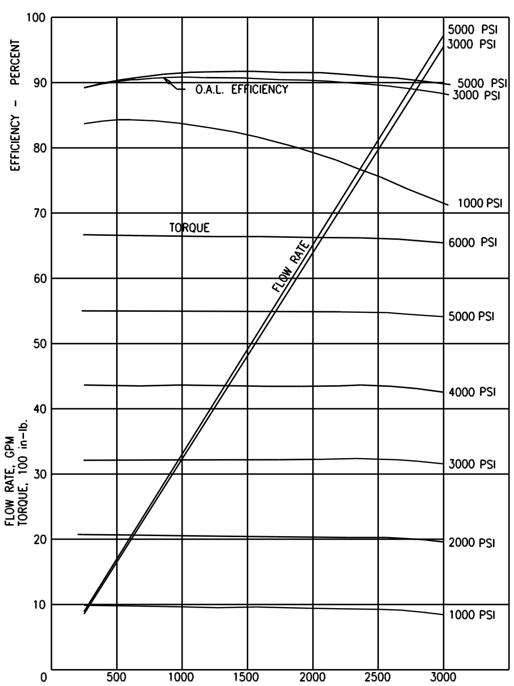
PRESSURE - PSI

Performance curves Series 7
Pump at full displacement



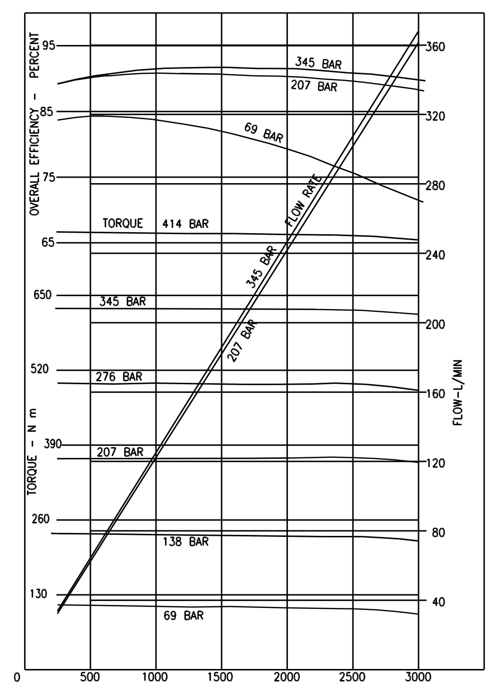
PRESSURE - BAR

Performance curves Series 7
Pump at full displacement



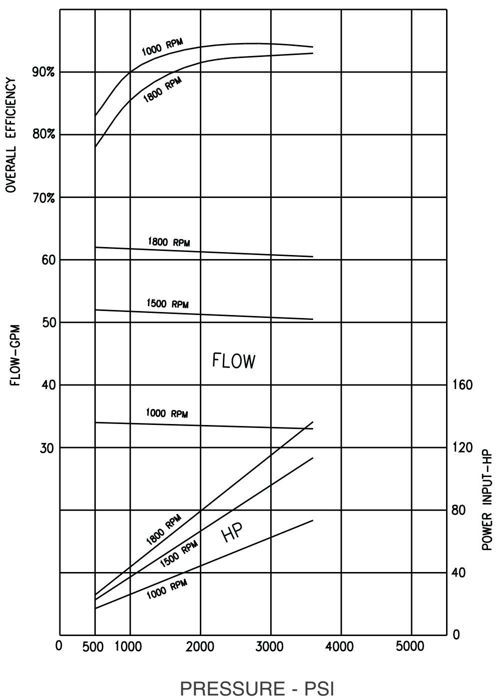
SPEED - RPM

Performance curves Series 7
Motor at full displacement

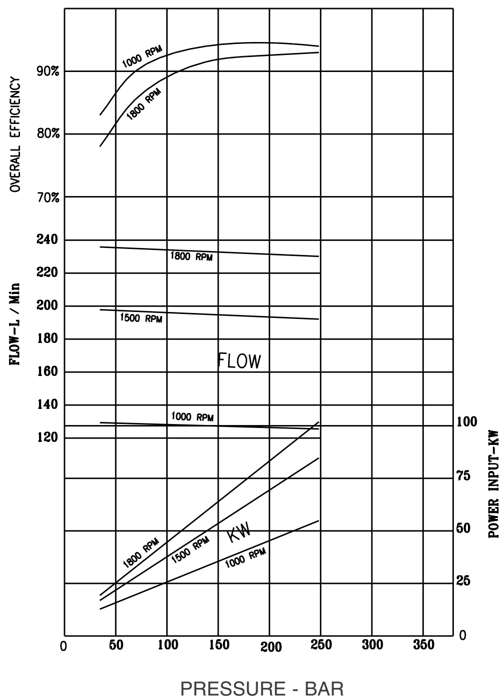


SPEED - RPM

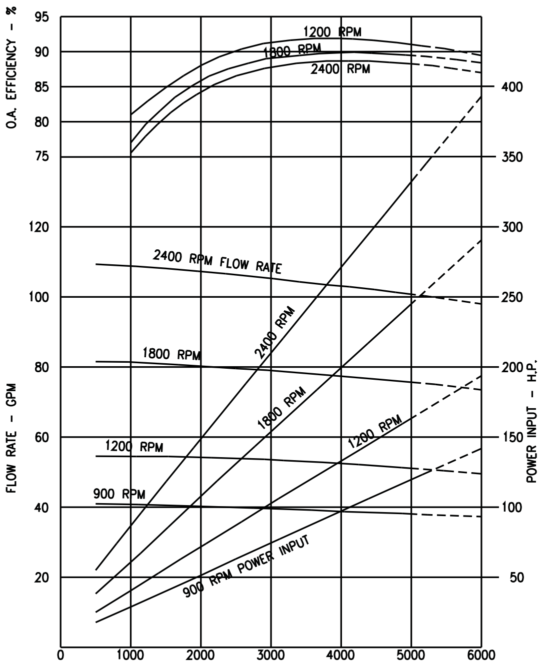
Performance curves Series 7
Motor at full displacement



Performance curves Series 8
Pump at full displacement

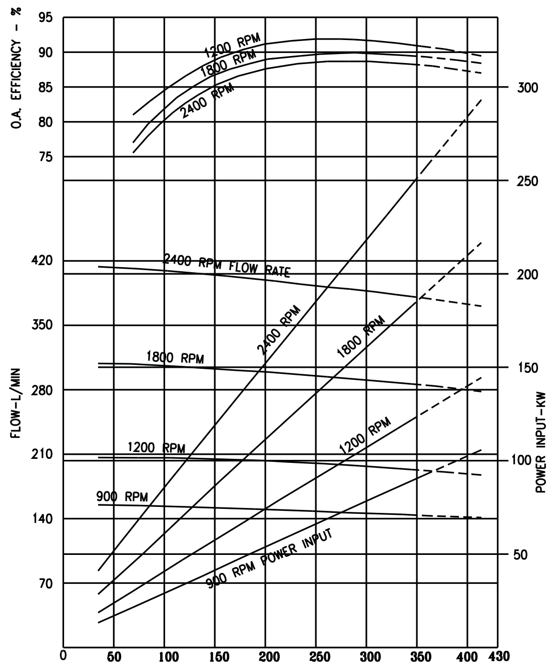


Performance curves Series 8
Pump at full displacement



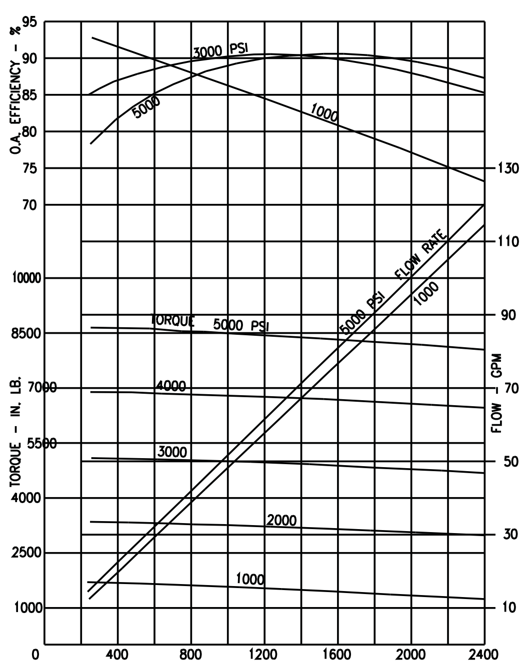
PRESSURE - PSI

Performance curves Series 11
Pump at full displacement



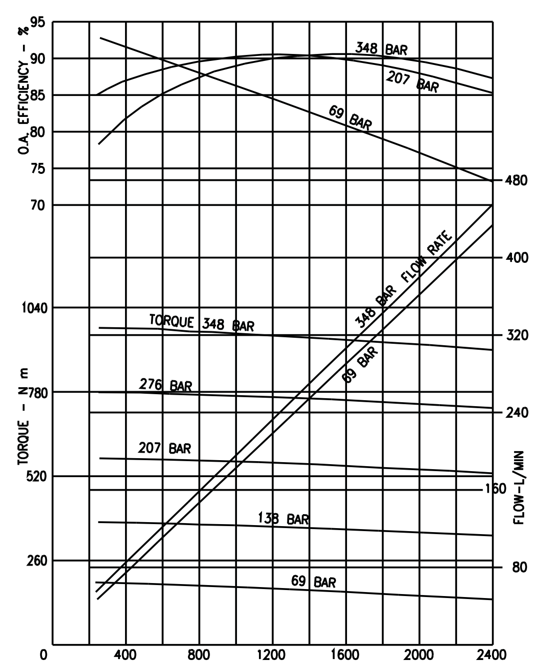
PRESSURE - BAR

Performance curves Series 11
Pump at full displacement



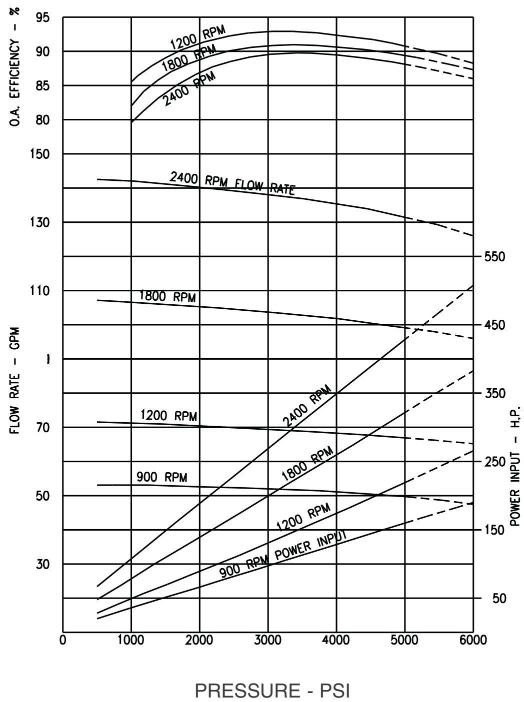
SPEED - RPM

Performance curves Series 11
Motor at full displacement

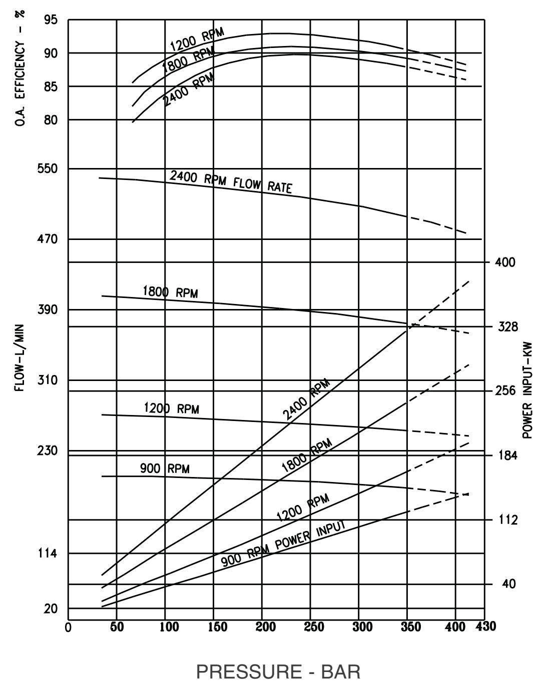


SPEED - RPM

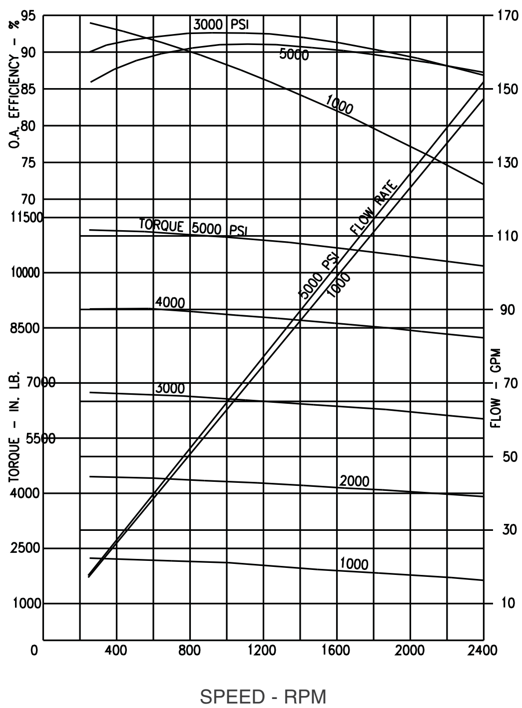
Performance curves Series 11
Motor at full displacement



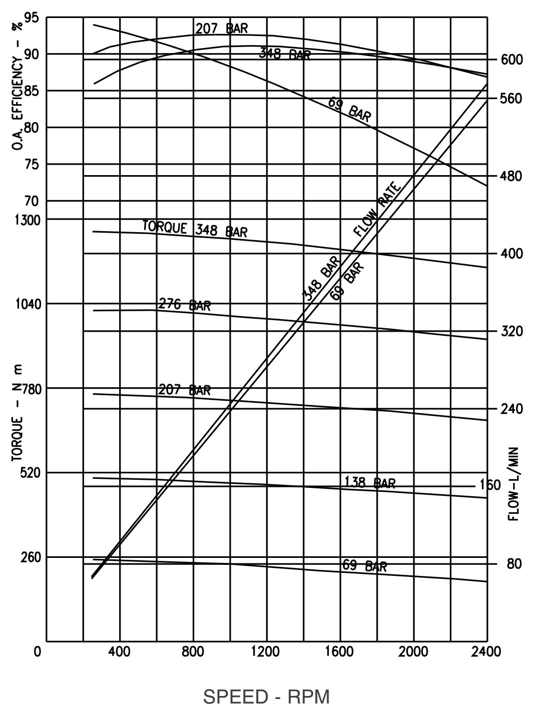
Performance curves Series 14
Pump at full displacement



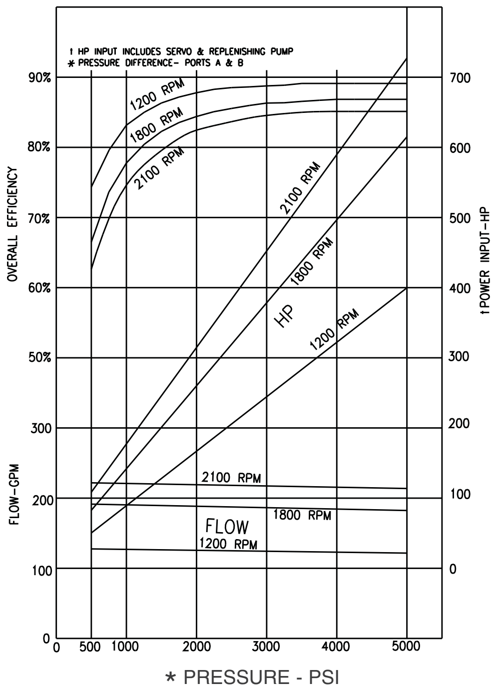
Performance curves Series 14
Pump at full displacement



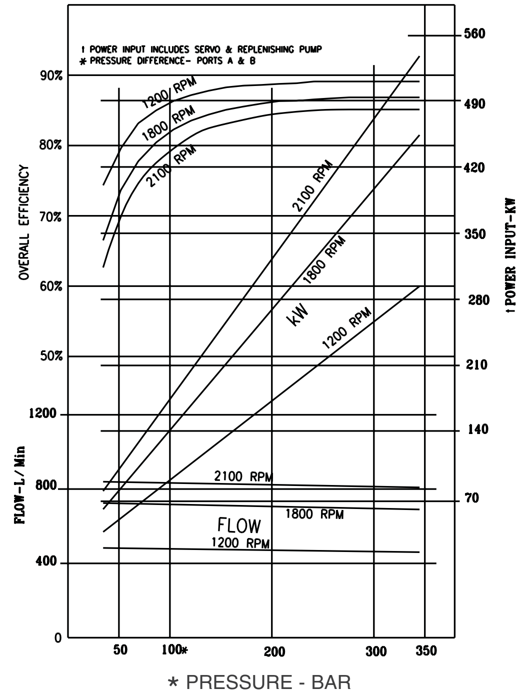
Performance curves Series 14
Motor at full displacement



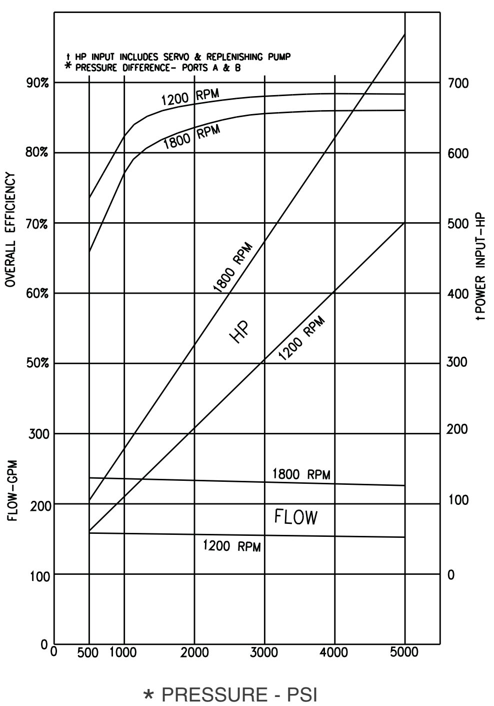
Performance curves Series 14
Motor at full displacement



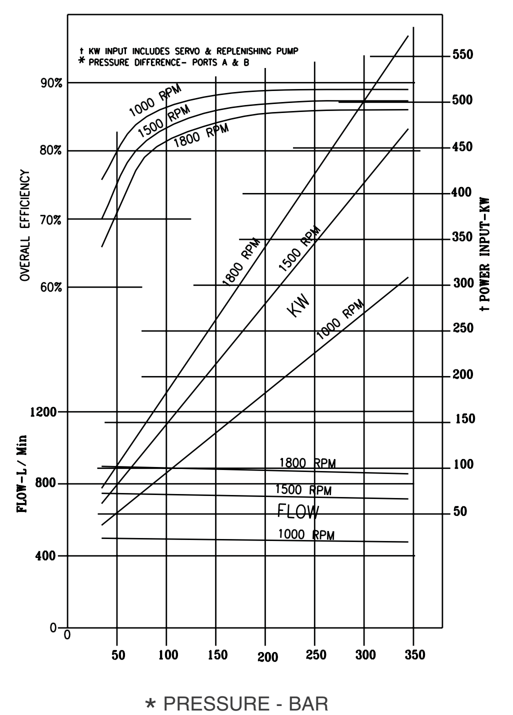
Performance curves Series 24
Pump at full displacement



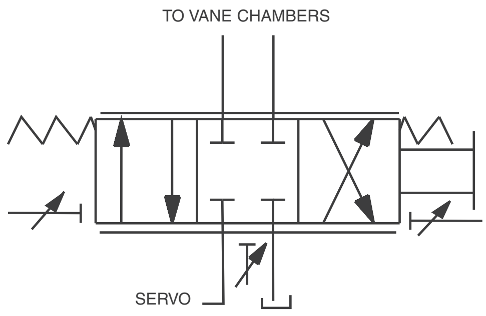
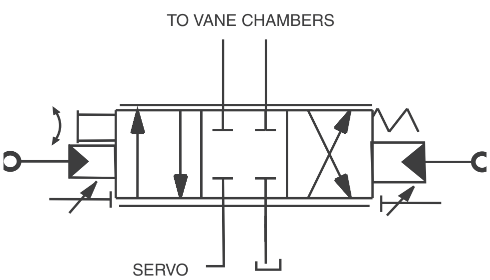
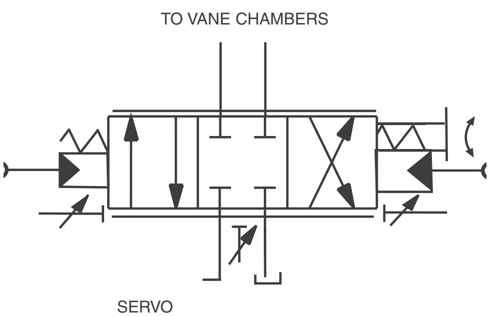
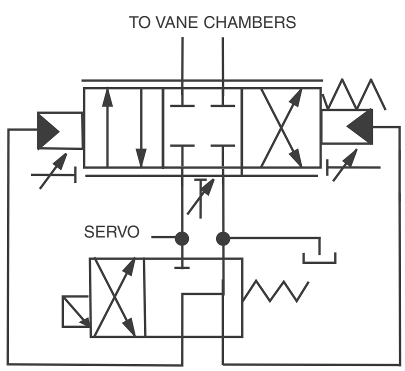
Performance curves Series 24
Pump at full displacement

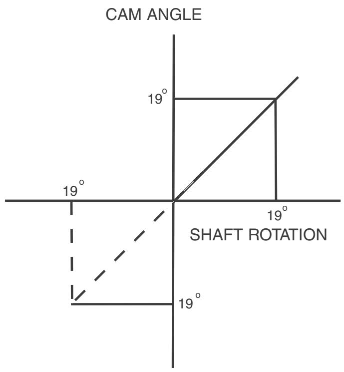
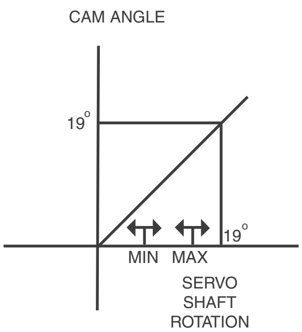
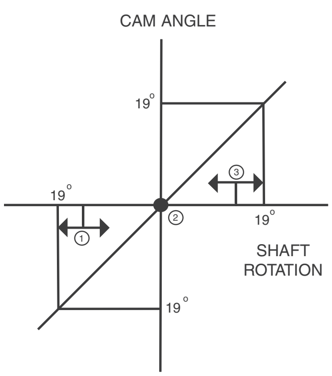
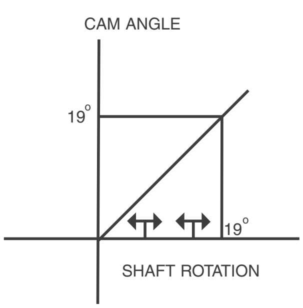


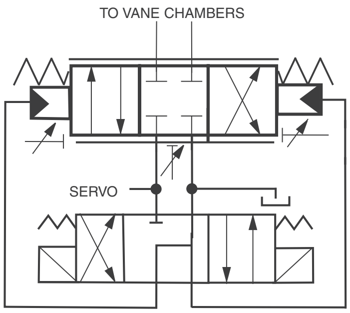
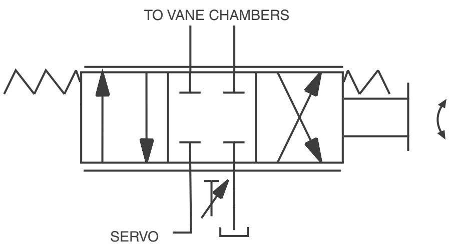
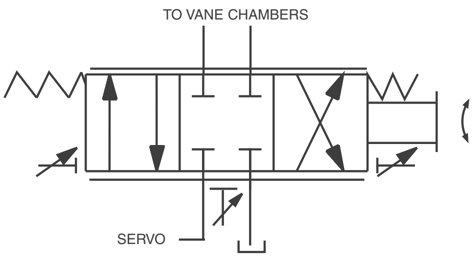
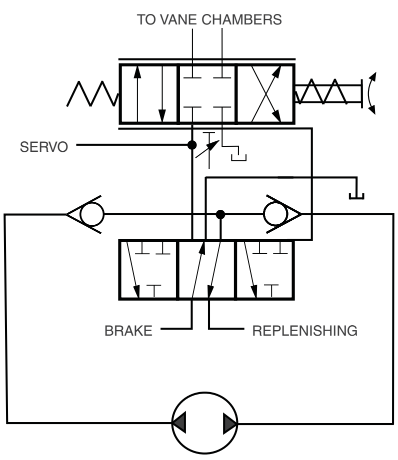
Performance curves Series 30
Pump at full displacement



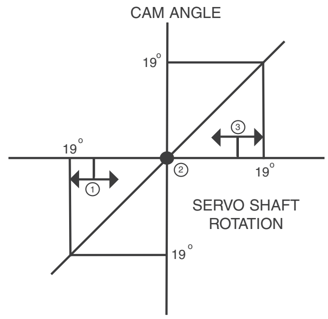
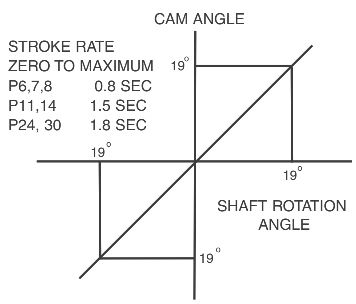
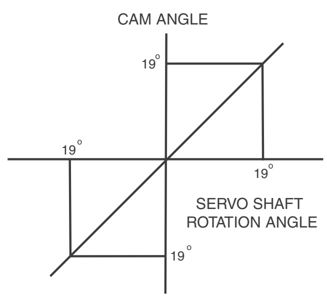
Performance curves Series 30
Pump at full displacement

CODE	DESCRIPTION	HYDRAULIC CIRCUIT
10	MANUAL SCREW ADJUST	
2A	TWO POSITION CONTROL	
2H	3 POSITION CONTROL	
2M	2 POSITION CONTROL WITH CEPTOP3, NG6 VALVE	

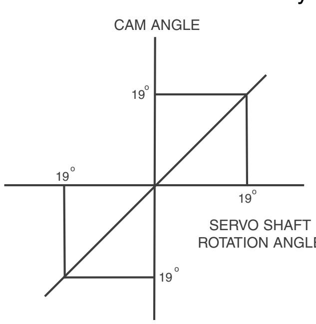
TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION
	Spring loaded toward maximum displacement, with an adjustment screw to limit the displacement anywhere between 0% and 100%. A minimum volume stop is also supplied so that when the rotary servo shaft is turned, the displacement can be varied only between the minimum and maximum settings. Torque required to rotate servo shaft: 20 lb-in, 2.56 Nm.
	Hydraulically piloted non-proportionally between adjustable minimum and maximum displacements. The control is spring loaded toward minimum when used on pumps, to maximum on motors. Servo pressure is switched by an external valve to drive the control in either direction. When used on motors, the minimum setting can be set no lower than 30% of maximum.
	Hydraulically piloted non-proportionally between an adjustable minimum displacement of 0±5% and two fully adjustable maximum displacements, one in either direction, and spring loaded toward minimum. Servo pressure is switched by an external valve to drive the control in either direction.
	Same as 2A except a CEPTOP3, NG6 two position directional valve is mounted to the control. With the solenoid de-energized, the control is spring loaded to zero for pumps and to maximum displacement for motors. Energizing the solenoid drives the control toward maximum displacement on pumps, minimum on motors. When used on motors, the minimum settings can be no less than 30% of maximum.

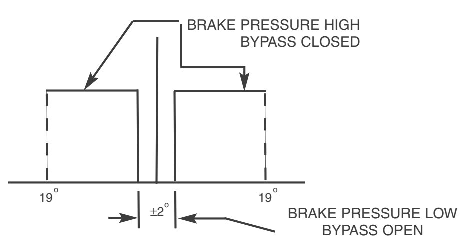
CODE	DESCRIPTION	HYDRAULIC CIRCUIT
2N	3 POSITION CONTROL WITH CEPTOP3, NG6 VALVE	
40	SPRING CENTERED ROTARY SERVO	
4A	SPRING CENTERED ROTARY SERVO WITH ADJUSTABLE STOPS	
4B	SPRING CENTERED ROTARY SERVO WITH AUTOMATIC BRAKE AND BYPASS CONTROL	

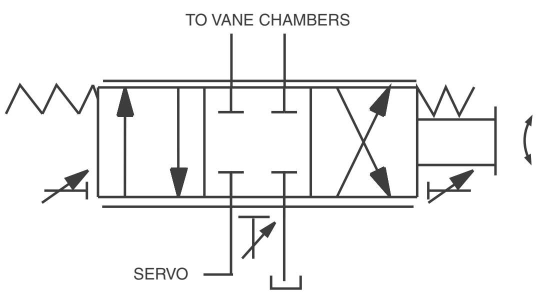
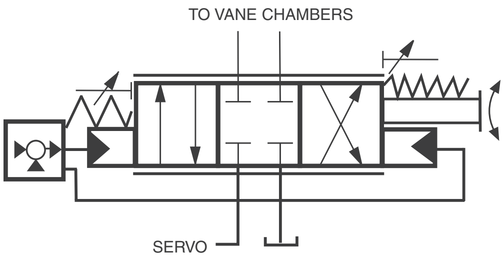
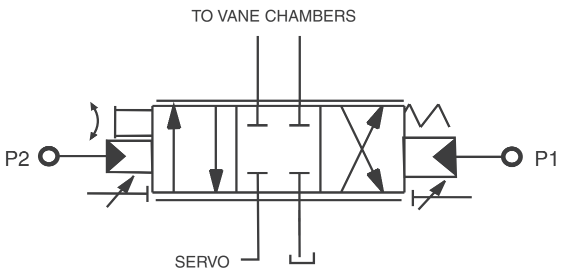
Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

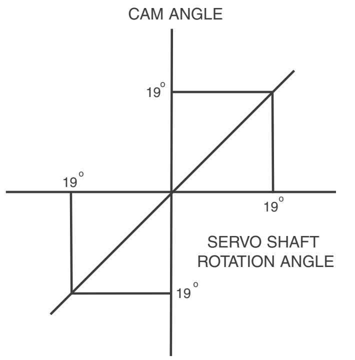
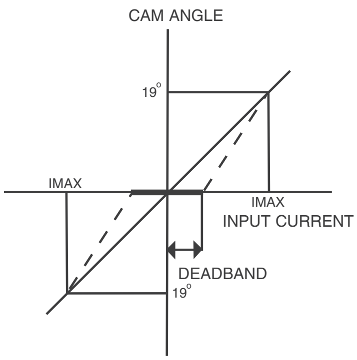
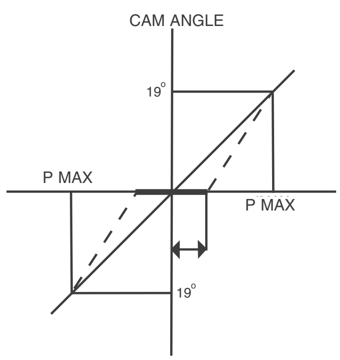
TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION
	Same as 2H except a CEPTOP3, NG6 three position directional valve is mounted to the control. With the solenoids de-energized, the control is spring loaded to zero. Energizing a solenoid drives the control toward maximumdisplacement in one of the two directions.
	The 40 is the basic displacement control for all Goldcup. It is actuated by a servo shaft that is rotated from 0º - 19º, either side of center. This action opens a unique slide valve to port servo oil to and from the vane chambers that actuate the rocker cam. Vanes, integral to the cam, move the cam so that it follows the rotary servo input shaft motion exactly. When the cam reaches the position equal to that of the input shaft, the slide valve closes. Any cam motion due to pumping forces immediately opens the slide valve to correct the cam position. Springs cause the control to return to zero stroke when no external force is applied to the servo shaft. An adjustment is provided to locate the exact zero position, to prevent machine creep.
	The 4A control is the same as the 40, with addition of adjustable maximum volume stop screws, with locking caps, to limit the control to less than 100% displacement. Stops are present on both sides of center and may be set independently to different settings.

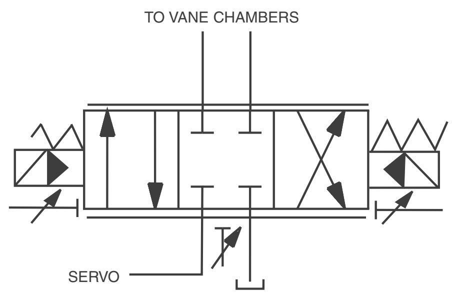
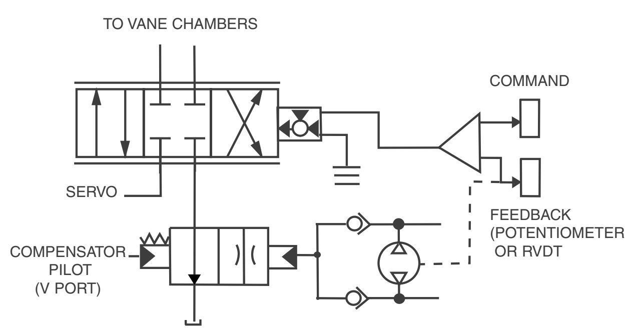
The 4B control is the same as the 4A control, with the addition of an output port that will provide servo pressure to control a spring applied, pressure released parking brake. The control contains anticoincidence functions that cause the brake to release immediately upon application of an on-stroke motion at the rotary servo shaft, and that cause the brake to remain released even after the rotary servo shaft is recentered, until the pump rocker cam actually returns to zero, at which time the brake will set. Additionally, a small bypass is opened between the pump A & B ports to bypass any flow that is generated if the pump is not exactly zeroed. The bypass closes whenever the brake is released.





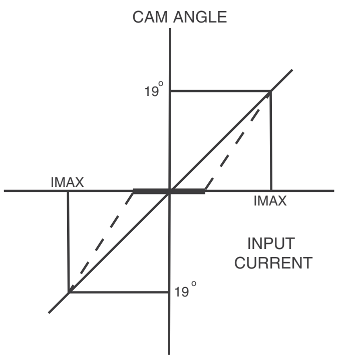
CODE	DESCRIPTION	HYDRAULIC CIRCUIT
4C	SPRING CENTERED BRAKE AND ADJUSTABLE BYPASS CONTROL (AUTOMATIC BRAKE CONTROL)	
5A	ELECTROHYDRAULIC CONTROL	
8A	HYDRAULIC STROKER	

TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION
	This control combines the features of the 4A and 4B controls.See above descriptions.
	The 5A control controls displacement in proportion to an electric current between zero and 350 milliamps. The control is available with or without a 10% deadband. Positive polarity drives the control in one direction, and negative polarity in the other. Adjustable maximum displacement stops are included. The 5C option, with automatic brake control, is also available.
	The 8A control controls displacement in proportion to a hydraulic pressure, values listed below. Pressure applied in the P1 port drives the pump on stroke in one direction, P2 port in the other. Adjustable maximum displacement stops are included. The 8C option, with automatic brake control, is also available.

CODE	DESCRIPTION	HYDRAULIC CIRCUIT
9A	ELECTRIC STROKER	
7D6 7D8 7F6 7F8	HIGH IQ SERVOVALVE CONTROL	

Parker Hannifin Corporation
Hydraulic Pump Division
Marysville, Ohio USA

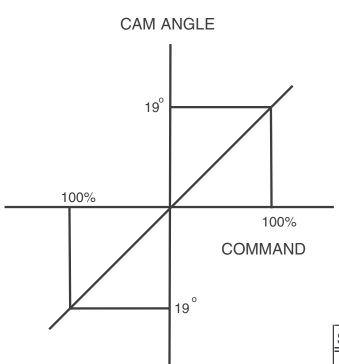
TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION



The 9A control controls displacement in proportion to an electric current between zero and 350 milliamps for the 24 volt version, and up to 650 milliamps for the 12 volt version. The control signal is a Pulse Width Modulated signal. Current signal to one coil drives the pump in one direction, and to the other coil in the opposite. Adjustable maximum displacement stops are included. The 9C option, with automatic brake control, is also available.

Specifications:			
Hysteresis	5% typical, 8% maximum		
Linearity	8%		
Response	P6,7,8	0.9 seconds, zero to full stroke or back	
	P11,14	1.5 seconds, zero to full stroke or back	
	P24, 30	1.8 seconds, zero to full stroke or back	
Repeatability	2%		
Temperature null shift	<2% per 100ºF (38º C)		
Servo pressure required	200-1000 psi (14-70 bar), 400 nominal (28 bar)		
Coil resistance	41 ohms (24v coil) & 10 ohms (12v coil)		
Electrical input*	270 ma minimum, 325 ma nominal, 380 ma maximum (24v coil)		
Neutral deadband*	150 ma minimum, 180 ma nominal, 210 ma maximum (24v coil)		
Manual override	3/16" Allen wrench, 30 in-lb (3.4Nm) with zero signal		
Fluid types	All		
Available open-loop drivers	Jupiter 900 card		S20-14078
	Dual Driver module		027-22071-0
	Power supply		762-30026-0
	Euro card holder		EX00-S07
Electrical connector	DIN 43650 type AF, 16-01008-8		
Fluid cleanliness	NAS 1638, class 8 or ISO 17/14		

* 12V coils are twice these values

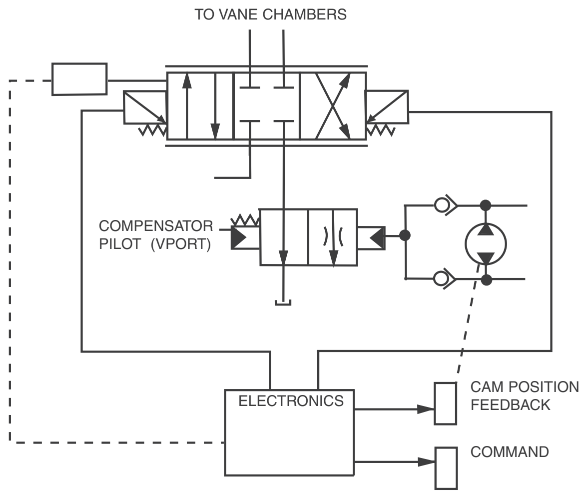
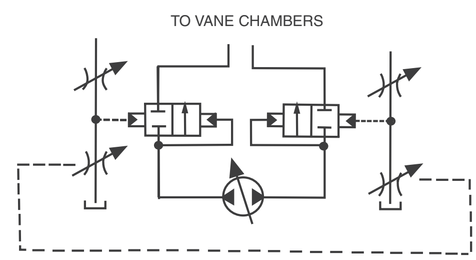


The 7** control is a high response displacement control that uses a servovalve to direct high flow levels to and from the vane chambers, in order to achieve high stroke rates on the pump. A feedback potentiometer or RVDT (Rotary Variable Differential Transformer) is used to feed back the rocker cam position to the controlling electronics to achieve stable operation.

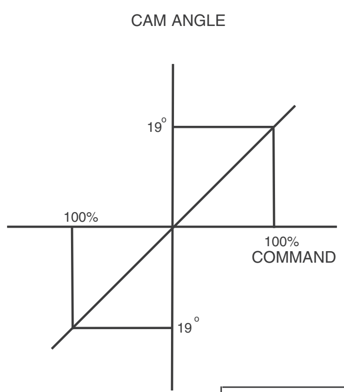
The 7D6 control uses a servovalve and a feedback potentiometer for feedback, the 7D8 uses an RVDT.

The 7F6 control uses servovalve and a the feedback potentiometer, but also has a special valve block with a valve in it to shut off the servovalve, so that control may be taken over by a 4A2 control also mounted to the pump as a manual override. The 7F8 is the same, except using an RVDT.

Specifications for 7D,7F:			
	P6,7,8	P11,14	P24/30
Hysteresis	<±1%	<±1%	±1%
Linearity	<±0.5%	<±0.5%	±0.5%
Step Response	180ms	300 Ms	360 Ms
Small Signal Frequency Response	10 Hz, 400 psi (28 bar)	8.2 Hz,, 440 psi (30 bar)	6 Hz,, 500 psi (35 bar)
	17 Hz,, 1000psi (70 bar)	13 Hz,, 1000 psi (70 bar)	9 Hz,, 1000 psi (70 bar)
Servo Pressure	1000 psi (70 bar) nominal		
Coil Resistance	1000 ohms		
Electrical Input	0-10 ma		
Feedback Pot Output,	±3 VDC		
19", 15 VDC excitation			
Feedback RVDT Output,	±2.4 VDC		
19", 15 VDC excitation			
Fluid Types	All		
Fluid Cleanliness	NAS 1638, class8 or ISO 17/14		
Available Drivers	Jupiter High IQ S20-11958		
Electrical Connectors	supplied with pump		

CODE	DESCRIPTION	HYDRAULIC CIRCUIT
7J6 7J8 7K6 7K8	HIGH IQ DF+ CONTROL PROPORTIONAL VALVE	
--4	TORQUE LIMITER OVERRIDE	

TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION

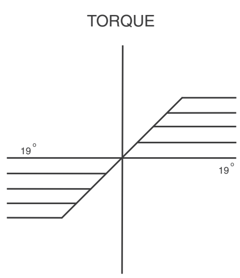


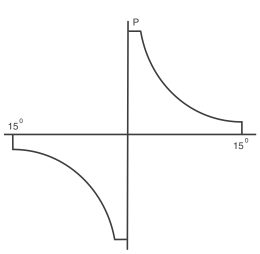
The 700 controls are high response displacement controls that use proportional directional flow control valves to direct high flow levels to and from the vane chambers, in order to achieve high stroke rates on the pump A feedback potentiometer or RVDT (Rotary Variable Differential Transformer) is used to feed back the rocker cam position to the controlling electronics to achieve stable operation.

The 7J6 control uses a proportional directional control valve and a feedback potentiometer for feedback, the 7J8 uses an RVDT.

The 7K6 control uses proportional directional control valve and a the feedback potentiometer, but also has a special valve block with a valve in it to shut off the servovalve, so that control may be taken over by a 4A2 control also mounted to the pump as a manual override. The 7K8 is the same, except using an RVDT.

Specifications for 7J, 7K			
	P6,7,8	P11,14	P24/30
Hysteresis	<±1%	<±1%	<±1%
Linearity	<±0.9%	<±0.9%	±0.9%
Step Response	180 ms	300 ms	300 ms
Small Signal Frequency Response	16 Hz, 400 psi (28 bar)	12 Hz,, 440 psi (30 bar)	8Hz,, 500 psi (35 bar)
	25 Hz,, 1000 psi (70 bar)	20 Hz,, 1000 psi (70 bar)	10 Hz,, 1000 psi (70 bar)
Servo Pressure	1000 psi (70 bar) nominal		
Coil Resistance	4 ohms		
Feedback Pot Output	±3 VDC at 19º, 15 VDC excitation		
Feedback RVDT Output,	±2.4 VDC at 19º, 15 VDC excitation		
Fluid Types	All		
Fluid Cleanliness	NAS 1638, class 8 or ISO 17/14		
Available Drivers	Digital EC01 cards (see publication LT3-00055-1)		
Electrical Connector			

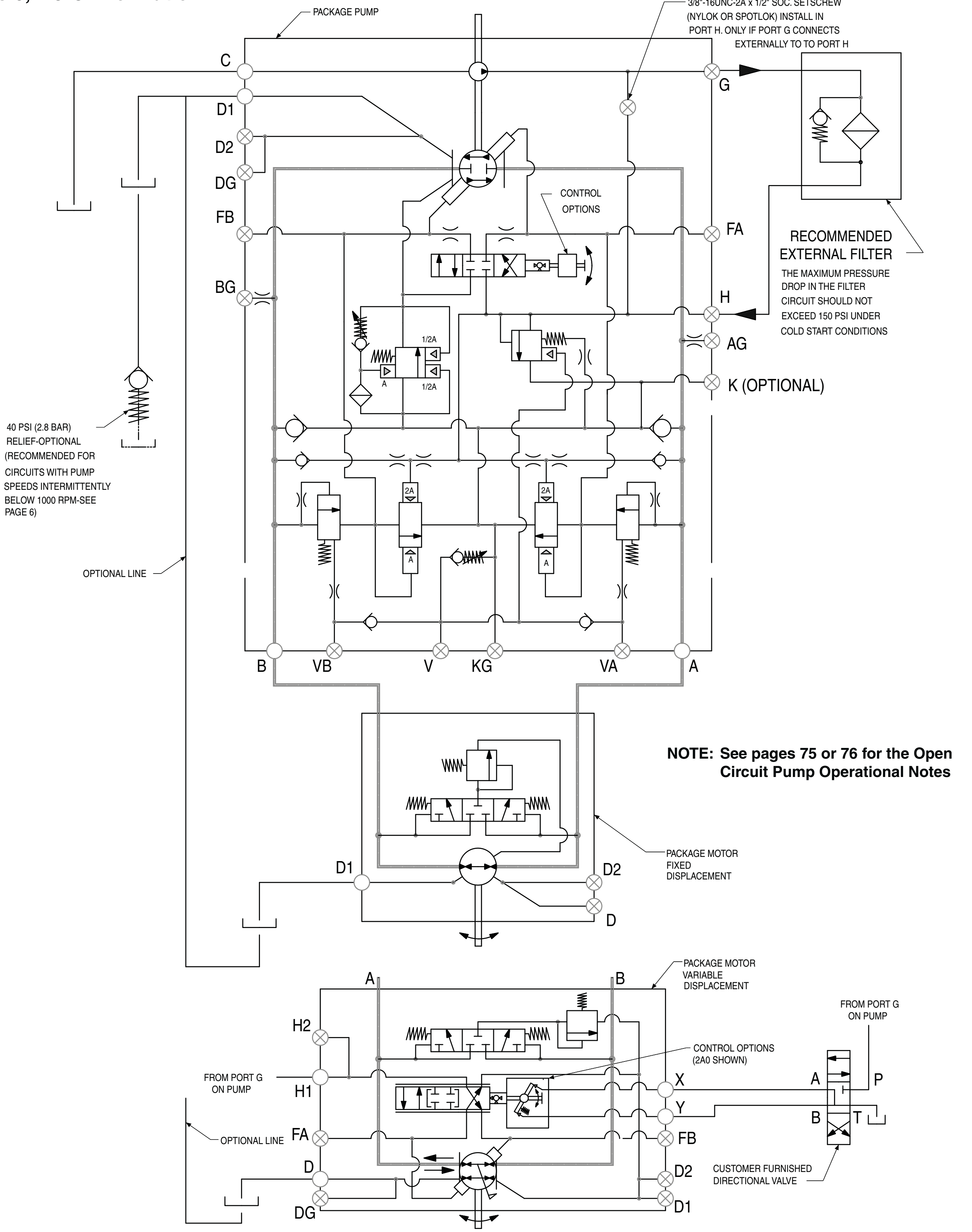




The **4 control option can be added to any other control, except the 7**, and will limit the amount of torque accepted by the drive shaft on the pump by reducing displacement if the product of pressure and flow (displacement) exceed a preset value. This will allow the pump to go to full stroke, but not at maximum pressure, and it will allow the pump to go to full pressure, but not at maximum flow. When the condition causing the overload disappears, the pump control reverts to the main displacement control. The pressure compensator override is always in effect, at all times, and its function is not effected by this control in any way.

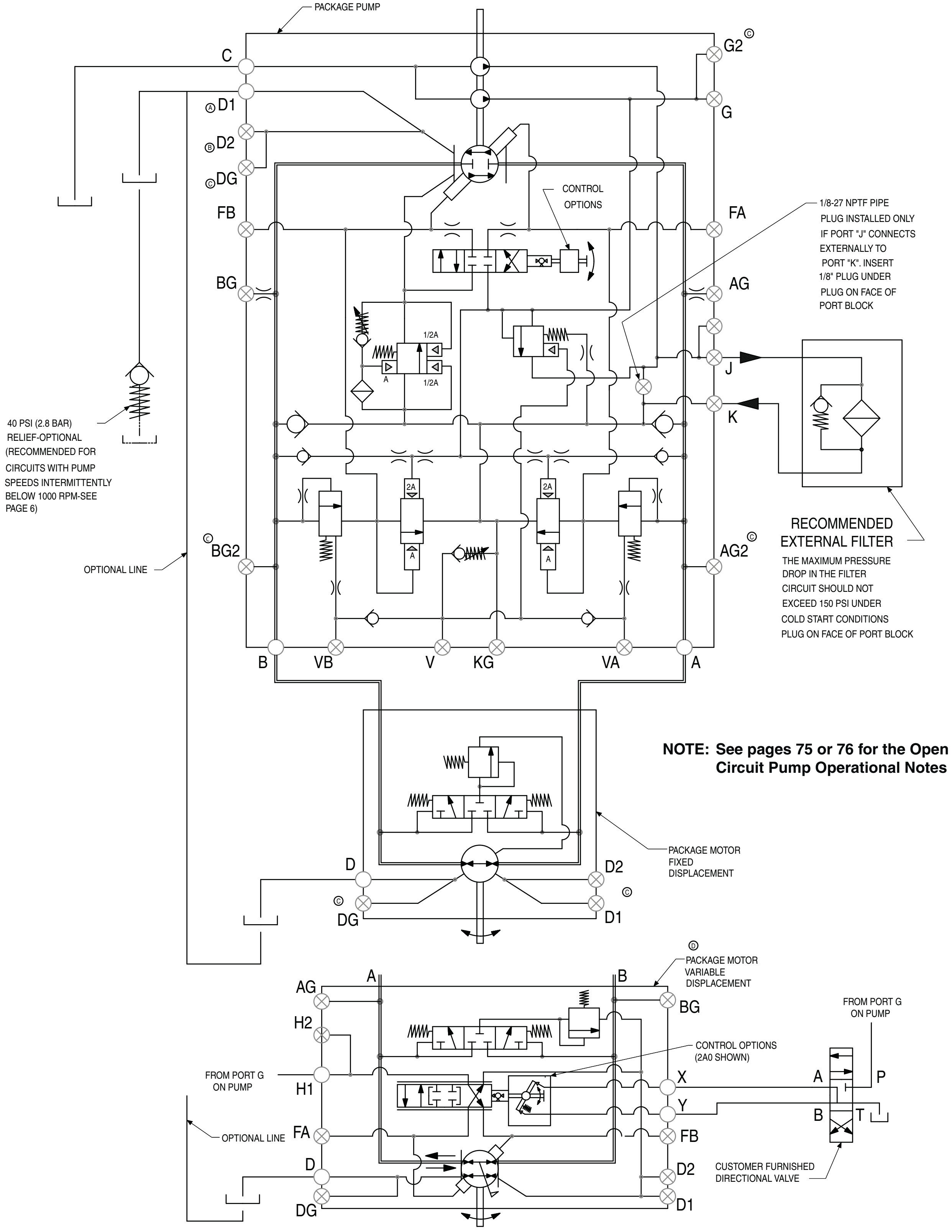
Minimum setting is 25% of maximum input torque.
(5000 (PSI) x MAX Displacement / 2π

Series 6, 7 & 8 Information



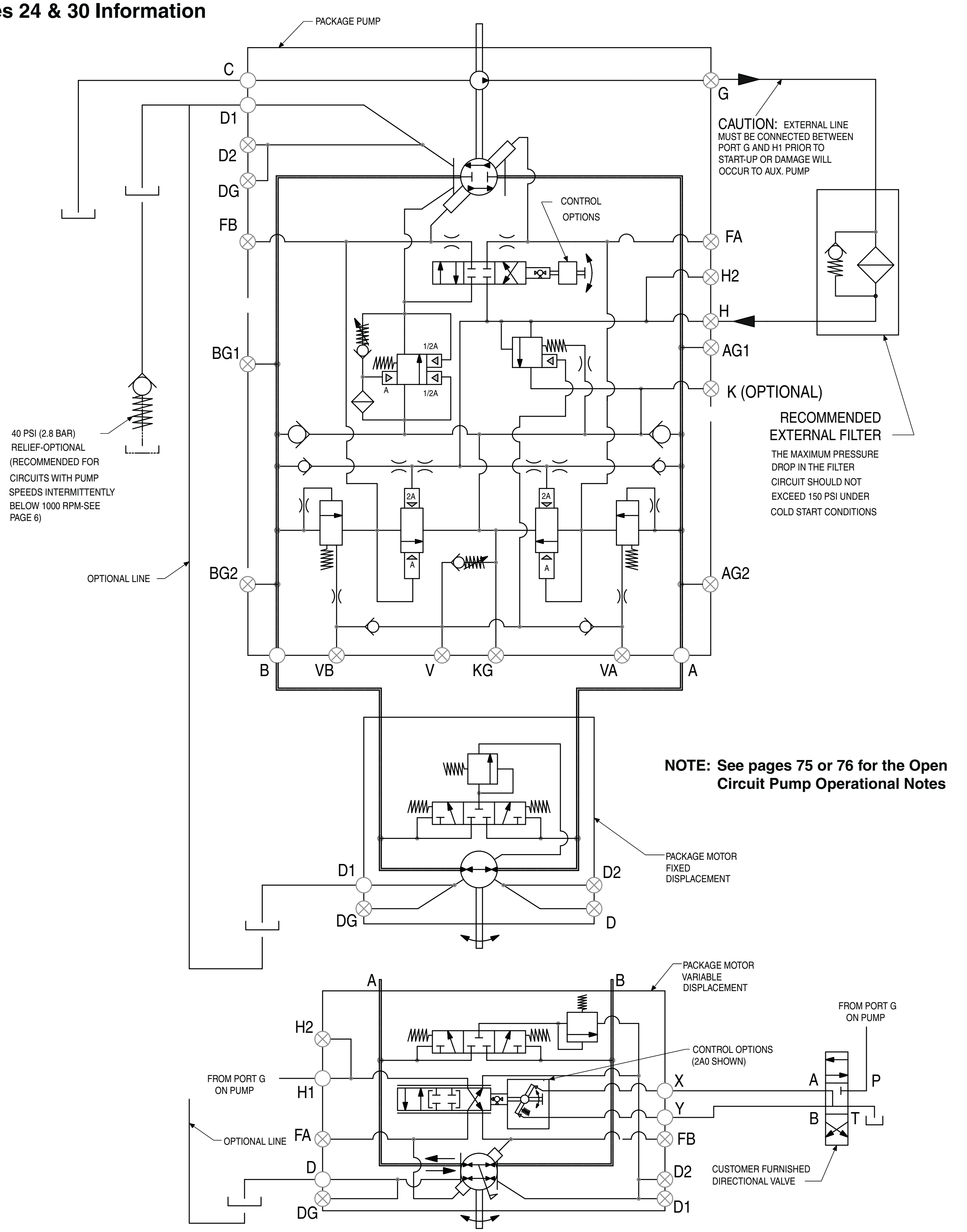
NOTE: See pages 75 or 76 for the Open Circuit Pump Operational Notes

Series 11 & 14 Information



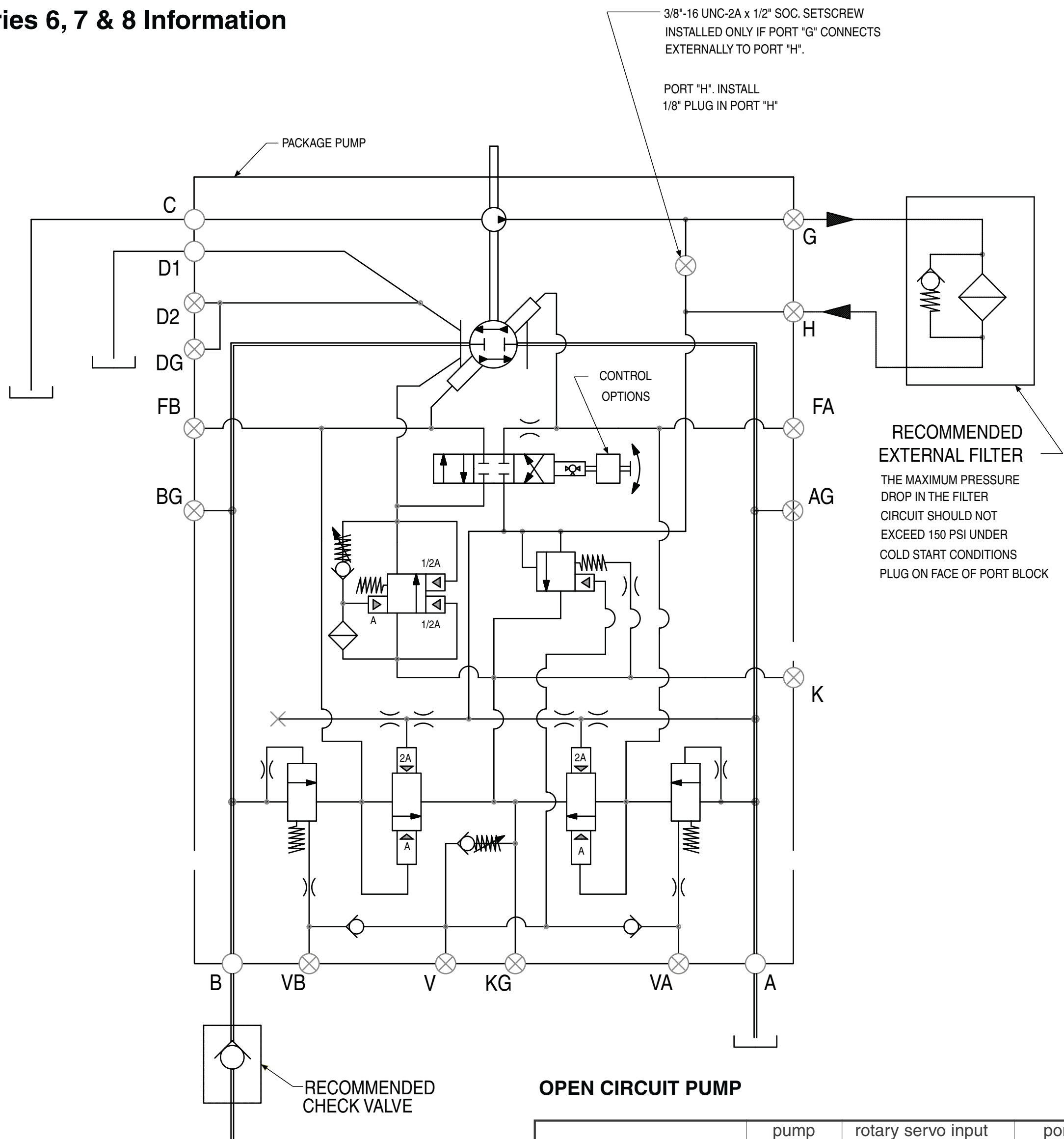
NOTE: See pages 75 or 76 for the Open Circuit Pump Operational Notes

Series 24 & 30 Information



NOTE: See pages 75 or 76 for the Open Circuit Pump Operational Notes

Series 6, 7 & 8 Information



OPEN CIRCUIT PUMP

	pump rotation	rotary servo input shaft rotation	port "A"	port "B"
input command "A" side	R	CW	inlet	outlet
	L	CCW	inlet	outlet
input command "B" side	R	CCW	inlet	outlet
	L	CW	inlet	outlet

NOTES:

1. The auxiliary pump inlet must be connected directly to the reservoir. See page 55 for main pump and auxiliary pump inlet requirements.

2. Case pressure must not exceed inlet pressure by more than 25 psi, 1,7 bar.

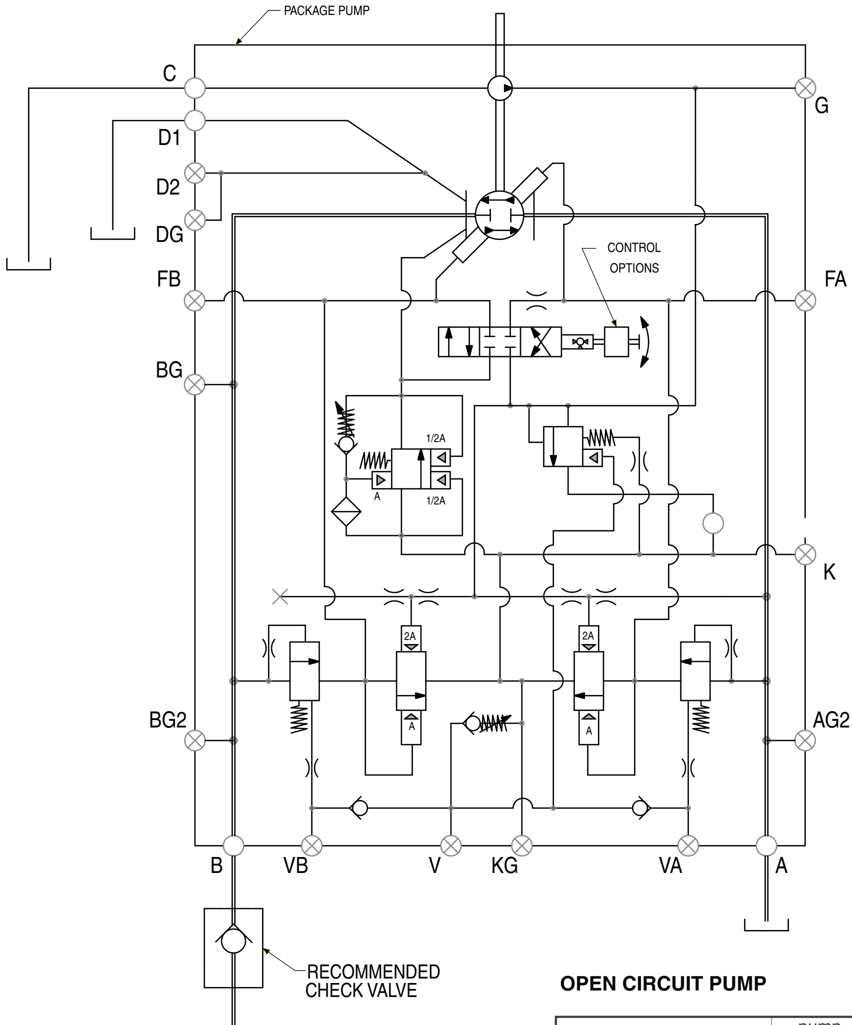
3. Maximum allowable inlet (port C) pressure: 200 psi, 13,8 bar.

4. Filters must use bypass valves.

5. Absolute inlet pressure must be increased for the following fluids:
   a. 25% for water glycols
   b. 35% for phosphate esters

6. A check valve in the outlet line between the pump and load is highly recommended where hoses, accumulators or other components may decompress when pump is vented by the compensator.

Series 11 & 14 Information



OPEN CIRCUIT PUMP

	pump rotation	rotary servo input shaft rotation	port "A"	port "B"
input command "A" side	R	CW	inlet	outlet
	L	CCW	inlet	outlet
input command "B" side	R	CCW	inlet	outlet
	L	CW	inlet	outlet

NOTES:

1. The auxiliary pump inlet must be connected directly to the reservoir. See page 55 for main pump and auxiliary pump inlet requirements.

2. Case pressure must not exceed inlet pressure by more than 25 psi, 1,7 bar.

3. Maximum allowable inlet (port C) pressure: 200 psi, 13,8 bar.

4. Filters must use bypass valves.

5. Absolute inlet pressure must be increased for the following fluids:
   a. 25% for water glycols
   b. 35% for phosphate esters

6. A check valve in the outlet line between the pump and load is highly recommended where hoses, accumulators or other components may decompress when pump is vented by the compensator.

GOLD CUP® PUMP CONTROL COMBINATIONS

102	2M2 *00	2N2 *00	402	5A2 *00	7D6 *00	8A2 *00	8C2 *00	9A2 *00
104	2M2 *01	2N2 *01	404	5A2 *01	7D6 *01	8A2 *01	8C2 *01	9A2 *01
106	2M2 *02	2N2 *02	406			8A2 *02	8C2 *02	
	2M2 *03	2N2 *03		5A4 *00		8A2 *03	8C2 *03	9A4 *00
108	2M2 *04	2N2 *04	408	5A4 *01		8A2 *04		9A4 *01
	2M2 *05	2N2 *05					8C4 *00	
2A2	2M2 *06	2N2 *06	4A2	5A6 *00	7D8 *00	8A4 *00	8C4 *01	9A6 *00
2A4	2M2 *07	2N2 *07	4A4	5A6 *01	7D8 *01	8A4 *01	8C4 *02	9A6 *01
2A6			4A6			8A4 *02	8C4 *03	
	2M4 *00	2N4 *00			7F6 *01	8A4 *03		9A7*00
2A8	2M4 *01	2N4 *01	4A8			8A4 *04	8C6 *00	
	2M4 *02	2N4 *02			7F8 *01		8C6 *01	
2H2	2M4 *03	2N4 *03	4B2	5A8 *00		8A6 *00	8C6 *02	9A8 *00
2H4	2M4 *04	2N4 *04	4B4	5A8 *01	7J6 *00	8A6 *01	8C6 *03	9A8 *01
2H6	2M4 *05	2N4 *05	4B6		7J6 *01	8A6 *02		
	2M4 *06	2N4 *06		5C2 *00		8A6 *03		9C2 *00
2H8	2M4 *07	2N4 *07	4B8	5C2 *01		8A6 *04		9C2 *01
	2M6 *00	2N6 *00	4C2	5C4 *00				9C4 *00
	2M6 *01	2N6 *01	4C4	5C4 *01	7J8 *00			9C4 *01
	2M6 *02	2N6 *02	4C6		7J8 *01		8C8 *00	
	2M6 *03	2N6 *03		5C6 *00			8C8 *01	9C6 *00
	2M6 *04	2N6 *04	4C8	5C6 *01	7K6 *01		8C8 *02	9C6 *01
	2M6 *05	2N6 *05					8C8 *03	
	2M6 *06	2N6 *06			7K8 *01	8A8 *00		
	2M6 *07	2N6 *07				8A8 *01		
						8A8 *02		
				5C8 *00		8A8 *03		9C8 *00
				5C8 *01		8A8 *04		9C8 *01
	2M8 *00	2N8 *00						
	2M8 *01	2N8 *01						
	2M8 *02	2N8 *02						
	2M8 *03	2N8 *03						
	2M8 *04	2N8 *04						
	2M8 *05	2N8 *05						
	2M8 *06	2N8 *06						
	2M8 *07	2N8 *07						

- Unless otherwise specified on purchase order, the following **factory setting** will be used.

Maximum Stops: Full Displacement (both sides of center pumps)
Minimum Stop: Zero Displacement (“V” units & 2A controls only)
Pressure Compensator Override: 1000 psi nominal
Torque Limiter (**4): P6 @ 1800 rpm = 60 hp nominal
(40% of full torque) P7 @ 1800 rpm = 72.5 hp nominal
P8 @ 1800 rpm = 80 hp nominal
P11 @ 1800 rpm = 110 hp nominal
P14 @ 1800 rpm = 140 hp nominal
P24 @ 1800 rpm = 240 hp nominal
P30 @ 1800 rpm = 300 hp nominal

P										
Pump	Displacement	Type	Efficiency	Shaft	Rotation	Seals	Design [2]	Primary Controls	Secondary Controls	Control Location

Code	Displacement
6	6.00 in^3/rev (98 cc/rev)
7	7.25 in^3/rev (119 cc/rev)
8	8.00 in^3/rev (131 cc/rev)
11	11.0 in^3/rev (180 cc/rev)
14	14.0 in^3/rev (229 cc/rev)
24	24.6 in^3/rev (403 cc/rev)
30	30.6 in^3/rev (501 cc/rev)

Code	Type
F	Fixed Displacement, Open/Closed Circuit
M	Fixed Displacement with High Torque Thru-Drive, Open/Closed Circuit
P	Variable Displacement, Closed Circuit
X	Variable Displacement with Medium Torque Thru-Drive, Closed Circuit
S	Variable Displacement with Medium Torque Thru-Drive & Shuttle Package, Closed Circuit
R	Variable Displacement with High Torque Thru-Drive, Closed Circuit
L	Variable Displacement with High Torque Thru-Drive & Shuttle Package, Closed Circuit
V	Variable Displacement, Open Circuit (P6, 7, 8, 11 & 14 only)
D	Variable Displacement, Open & Closed Circuit (P6, 7 & 8 only)

Code	Efficiency
H	High Efficiency (P24 only)
Omit	Standard Efficiency

Code	Shaft
2	Keyed SAE – Mechanical Shaft Seal (Single Lip Seal on P6, 7, 8F/M)
3	Splined SAE – Mechanical Shaft Seal (Single Lip Seal on P6, 7, 8F/M)
4	Keyed SAE-D (Mounting & Shaft) – Mechanical Shaft Seal (P6, 7 & 8 only, Single Lip Seal on Fixed Displacement Pumps)
-5	Splined SAE-D (Mounting & Shaft) – Mechanical Shaft Seal (P6, 7 & 8 only, Single Lip Seal on Fixed Displacement Pumps)
7	Keyed SAE – Double Lip Shaft Seal
8	Splined SAE – Double Lip Shaft Seal
9	Keyed (long) SAE – Double Lip Shaft Seal
10	Keyed (long) SAE – Mechanical Shaft Seal

Code	Rotation
R	Clockwise
L	Counterclockwise

Code	Seals
1	Nitrile (Buna-N)
4	EPR [1, 3]
5	Fluorocarbon

Code	Primary Controls
Omit	None (Fixed Displacement only)
10	Screw Adjustment (Spring Offset to Maximum Displacement)
2A	Cylinder Control w/Adjustable Maximum Volume Stops
2H	Cylinder Control – 3-Position (Spring Control with Zero Adjustment)
2M	Cylinder Control – 2-Position Electrohydraulic w/Adjustable Maximum Volume Stop (Spring Offset to Maximum Displacement) [1]
2N	Cylinder Control – 3-Position (Spring Centered) Electrohydraulic [1]
40	Rotary Servo – Spring Centered
4A	Rotary Servo – Spring Centered w/ Adjustable Maximum Volume Stops
4B	Rotary Servo – Spring Centered w/ Automatic Brake Control
4C	Rotary Servo – Spring centered w/ Adjustable Maximum Volume Stops & Automatic Brake Control
5A	Electrohydraulic Stroker w/Adjustable Maximum Volume Stops [1]
5C	Electrhydraulic Stroker w/Adjustable Maximum Volume Stops & Automatic Brake Control [1]
7D	High IQ with 10 GPM Servo Valve & Volume Indicator [1]
7F	High IQ with 10 GPM Servovalve & 4A (Rotary Servo) Control [1]
7J	High IQ with DF+ Valve & Volume Indicator [1]
7K	High IQ with DF+ Valve & 4A (Rotary Servo) Control [1]
8A	Hydraulic Stroker w/Adjustable Maximum Volume Stops
8C	Hydraulic Stroker w/Adjustable Maximum Volume Stops & Automatic Brake Control
9A	Electrohydraulic Stroker w/Adjustable Maximum Volume Stops [1]
9C	Electrohydraulic Stroker w/Adjustable Maximum Volume Stops & Automatic Brake Control [1]
9D	Electro-hydraulic stroker w/ adjustable maximum volume stops

Code	Secondary Controls
Omit	None (Fixed Displacement only)
2	Volume Indicator
4	Torque Limiter & Volume Indicator
6	Cam Position Feedback Potentiometer [1]
7	Cam Position Feedback RVDT (AC) [1]
8	Cam Position Feedback R VDT (DC) [1]

Code	Control Location
Omit	None (Fixed Displacement only)
A	Primary Control on Port A Side
B	Primary Control on Port B Side

1 Not ATEX approved.
2 Assigned by manufacturer
3 Not available when using "5A" or "5C" primary controls. Pump will be unpainted unless otherwise specified.

☐ = Omit if not required

Control & Displacement Features | Internal Pump | External Drive | External Mounting | Special Modifications

Control	Code	Control & Displacement Features
2M* & 2N*	00	CETOP3, NG6 Valve, 110AC/60Hz with Hirschmann Connector [1]
	01	CETOP3, NG6 Valve, 12VDC with Hirschmann Connector [1]
	02	CETOP3, NG6 Valve, 240VAC/50Hz with Hirschmann Connector [1]
	03	CETOP3, NG6 Valve, 110VAC/60Hz, Wiring Box [1]
	04	CETOP3, NG6 Valve, 12VDC, Wiring Box [1]
	05	CETOP3 (D03, NG6) Interface, No Valve [1]
	06	CETOP3, NG6 Valve, 24VDC with Hirschmann Connector [1]
	07	CETOP3, NG6 Valve, 110VAC/50Hz with Hirschmann Connector [1]
5**	00	With Deadband [1]
	01	Without Deadband [1]
7**	00	Without Manual Override Shutoff [1]
	01	With Manual Override Shutoff [1] (required for F & K primary options)
8**	00	75-350 PSI (5-24 Bar)
	01	75-435 PSI (5-30 Bar)
	02	100-380 PSI (7-26 Bar)
	03	150-400 PSI (10-28 Bar)
	04	75-250 PSI (5-17 Bar)
9**	00	24VDC
	01	12VDC
All Other	00	None [1]

Pump	Code	Reduced Displacement
P**F & P**M	00	Standard Cam (19°)
	10	P6 with 17° Cam – 5.3 in³/rev (87cc/rev) P7 with 17° Cam – 6.4 in³/rec (105 cc/rev) P8 with 17° Cam – 7.1 in³/rev (116 cc/rev) P11 with 17° Cam – 9.7 in³/rev (160 cc/rev) P14 with 17° Cam – 12.5 in³/rev (205 cc/rev) P24 with 17° Cam – 22.0 in³/rev (360 cc/rev) P30 with 17° Cam – 27.2 in³/rev (446 cc/rev)
	20	P6 with 15° Cam – 4.6 in³/rev (76 cc/rev) P7 with 15° Cam – 5.6 in³/rev (92 cc/rev) P8 with 15° Cam – 6.2 in³/rev (102 cc/rev) P11 with 15° Cam – 8.5 in³/rev (140 cc/rev) P14 with 15° Cam – 10.9 in³/rev (179 cc/rev)
	30	P6 with 13° Cam – 4.0 in³/rev (66 cc/rev) P7 with 13° Cam – 4.8 in³/rev (79 cc/rev) P8 with 13° Cam – 5.3 in³/rev (88 cc/rev)

Code	Internal Pump
0	1.07 in³/rev (17.5 cc/rev) – P6, 7, 8P/S/X/V/D & P11, 14V only 2.14 in³/rev (35 cc/rev) – P11, 14P/S/X only 2.81 in³/rev (46 cc.rev) – P24, 30P/S/X only (standard)
1	1.61 in³/rev (26.4 cc/rev) – P24, 30P/S/X only (auxiliary external replenishing flow required)
2	1.05 in³/rev (17.2 cc/rev) – P24, 30P/S/X only (auxiliary external replenishing flow required)
3	3.56 in³/rev (58.3 cc/rev) – P24, 30P/S/X only
4	4.84 in³/rev (79.3 cc/rev) – P24, 30P/S/X only
5	5.42 in³/rev (88.8 cc/rev) – P24, 30P/S/X only
6	6.10 in³/rev (100.0 cc/rev) – P24, 30P/S/X only
X	No Internal Pump (standard on P*R/L/F/M)

Code	External Drive
Omit	None [1]
M	Blanking plate – for P6, 7, 8, 11, 14S/X only
A	SAE-A (SAE 82-2) – P6, 7, 8, 11, 14S/X/R/L/M only
B	SAE-B (SAE 101-2) – P6, 7, 8, 11, 14, 24, 30/S/X/R/L/M SAE-B (SAE 101-4) – P11, 14, 24, 30R/L/M
C	SAE-C (SAE 127-2) – P6, 7, 8, 11, 14, 24, 30R/L/M & P24, 30S/X SAE-C (SAE 127-4) – P11, 14, 24, 30R/L/M
D	SAE-D (SAE 152-4) – P11, 14, 24, 30R/L/M only
E	SAE-E (SAE 165-4) – P11, 14, 24, 30R/L/M only
F	SAE-F (SAE 177-4) – P24, 30R/L/M only

Code	External Mounting
Omit	No External Drive Required
0	No External Pump Mounted
1	External Pump Mounted (must be separately specified) – Requires Special Modification “-M2” [1]
2	ATEX Externally Mounted Pump

Code	Special Modifications
Omit	None
NP	No Paint [1]
EX	ATEX APPROVED PUMP (May contain additional modifications. Contact tech support.)
M2	Other Special Modification (example: bronze caged barrel bearing for low viscosity fluids, tandem pumps, etc.) [1]

☐ = Omit if not required

Notes

GOLD CUP® MOTOR CONTROL COMBINATIONS

2A0		*2M3 *0		5A0 *0		8A0 *0		9A0 *0
*2A3		*2M3 *1		5A0 *1		8A0 *1		9A0 *1
*2A5		*2M3 *2						
2A6		*2M3 *3		5A3 *0		8A3 *0		9A3 *0
		*2M3 *4		5A3 *1		8A3 *1		9A3 *1
2A8		*2M3 *5						
		*2M3 *6		5A5 *0		8A5 *0		9A5 *0
2M0 *0				5A5 *1		8A5 *1		9A5 *1
2M0 *1								
2M0 *2		*2M5 *0		5A6 *0		8A6 *0		9A6 *0
2M0 *3		*2M5 *1		5A6 *1		8A6 *1		9A6 *1
2M0 *4		*2M5 *2						
2M0 *5		*2M5 *3						
2M0 *6		*2M5 *4						
		*2M5 *5						
		*2M5 *6		5A8 *0		8A8 *0		9A8 *0
				5A8 *1		8A8 *1		9A8 *1
		*2M6 *0						9D0*0
		*2M6 *1						9D081
		*2M6 *2						
		*2M6 *3						
		*2M6 *4						
		*2M6 *5						
		*2M6 *6						
		*2M8 *0						
		*2M8 *1						
		*2M8 *2						
		*2M8 *3						
		*2M8 *4						
		*2M8 *5						
		*2M8 *6						

- Not available for M24 or M30

Unless otherwise specified on purchase order, the following **factory setting** will be used.
Maximum Stop: Full Displacement
Minimum Stop: Approximately 30% Displacement
Reverse Pressure Compensator Override (**3 & **5): 1000 psi nominal

M					N					
Motor	Displacement	Type	Efficiency	Shaft	Bi-directional Rotation	Seals	Design [2]	Primary Controls	Secondary Controls	Control Location

Code	Displacement
6	6.00 in³/rev (98cc/rev)
7	7.25 in³/rev (119 cc/rev)
8	8.00 in³/rev (131 cc/rev)
11	11.0 in³/rev (180 cc/rev)
14	14.0 in³/rev (229 cc/rev)
24	24.6 in³/rev (403 cc/rev)
30	30.6 in³/rev (501 cc/rev)

Code	Type
F	Fixed Displacement
G	Fixed Displacement with Shuttle Package
M	Fixed Displacement with Thru-Drive
N	Fixed Displacement with Thru-Drive & Shuttle Package
V	Variable Displacement
H	Variable Displacement with Shuttle Package
R	Variable Displacement with Thru-Drive
L	Variable Displacement with Thru-Drive & Shuttle Package

Code	Efficiency
H	High Efficiency (M24 only)
Omit	Standard Efficiency

Code	Shaft
2	Keyed SAE – Mechanical Shaft Seal (Single Lip Seal on M6, 7, 8F/G/M/N)
3	Splined SAE – Mechanical Shaft Seal (Single Lip Seal on M6, 7, 8F/G/M/N)
4	Keyed SAE-D (Mounting & Shaft) – Mechanical Shaft Seal (M6, 7 & 8 only, Single Lip Seal on Fixed Displacement Motors)
5	Splined SAE-D (Mounting & Shaft) – Mechanical Shaft Seal (P6, 7 & 8 only, Single Lip Seal on Fixed Displacement Motors)
7	Keyed SAE – Double Lip Shaft Seal
8	Splined SAE – Double Lip Shaft Seal
9	Keyed (long) SAE – Double Lip Shaft Seal
10	Keyed (long) SAE – Mechanical Shaft Seal

Code	Seals
1	Nitrile (Buna-N)
4	EPR [3]
5	Fluorocarbon

Code	Primary Controls
Omit	None (Fixed Displacement only)
2A	Cylinder Control w/Adjustable Maximum Volume Stops
2M	Cylinder Control – 2-Position Electrohydraulic w/Adjustable Maximum Volume Stop (Spring Offset to Maximum Displacement) [1]
5A	Electrohydraulic Stroker w/ Adjustable Maximum Volume Stops [1]
8A	Hydraulic Stroker w/Adjustable Maximum Volume Stops
9A	Electrohydraulic Stroker w/ Adjustable Maximum Volume Stops [1]

Code	Secondary Controls
Omit	None (Fixed Displacement only)
0	Volume Indicator
3	Reverse Compensator (spring offset to maximum displacement) + Volume Indicator
5	Reverse Compensator (spring offset to minimum displacement) + Volume Indicator
6	Cam Position Feedback Potentiometer [1]
7	Cam Position Feedback RVDT (AC) [1]
8	Cam Position Feedback RVDT (DC) [1]
U	Reverse Compensator (3) + Cam Position Feedback Potentiometer (6) [1]
W	Reverse Compensator (3) + Cam Position Feedback RVDT (8) [1]
X	Reverse Compensator (5) + Cam Position Feedback Potentiometer (6) [1]
Z	Reverse Compensator (5) + Cam Position Feedback RVDT (8) [1]

Code	Control Location
Omit	None (Fixed Displacement only)
A	Primary Control on Port A Side
B	Primary Control on Port B Side

☐ = Omit if not required

1 Not ATEX approved.
2 Assigned by manufacturer.
3 Not available when using “5A” primary control. Motor will be unpainted unless otherwise specified.

Motor Ordering Code

Control & Displacement Features | Shuttle Valve Features | External Drive | External Mounting | Special Modifications

Control	Code	Control & Displacement Features
2M	0	CETOP3, NG6 Valve, 110AC/60Hz with Hirschmann Connector[1]
	1	CETOP3, NG6 Valve, 12VDC with Hirschmann Connector[1]
	2	CETOP3, NG6 Valve, 240VAC/50Hz with Hirschmann Connector[1]
	3	CETOP3, NG6 Valve, 110VAC/60Hz, Wiring Box[1]
	4	CETOP3, NG6 Valve, 12VDC, Wiring Box[1]
	5	CETOP3 (D03, NG6) Interface, No Valve[1]
	6	CETOP3, NG6 Valve, 24VDC with Hirschmann Connector[1]
	7	CETOP3, NG6 Valve, 110VAC/50Hz with Hirschmann Connector[1]
5A	0	With Deadband[1]
	1	Without Deadband[1]
8A	0	75-250 PSI (5-17 Bar)
	1	250-450 PSI (17-31 Bar)
9A	0	24VDC[1]
	1	12VDC[1]
All Other	0	None

Motor	Code	Reduced Displacement
M*F M*G M*M M*N	0	Standard Cam (19°)
	1	M6 with 17° Cam – 5.3 in^3/rev (87cc/rev) M7 with 17° Cam – 6.4 in^3/rec (105 cc/rev) M8 with 17° Cam – 7.1 in^3/rev (116 cc/rev) M11 with 17° Cam – 9.7 in^3/rev (160 cc/rev) M14 with 17° Cam – 12.5 in^3/rev (205 cc/rev) M24 with 17° Cam – 22.0 in^3/rev (360 cc/rev) M30 with 17° Cam – 27.2 in^3/rev (446 cc/rev)
	2	M6 with 15° Cam – 4.6 in^3/rev (76 cc/rev) M7 with 15° Cam – 5.6 in^3/rev (92 cc/rev) M8 with 15° Cam – 6.2 in^3/rev (102 cc/rev) M11 with 15° Cam – 8.5 in^3/rev (140 cc/rev) M14 with 15° Cam – 10.9 in^3/rev (179 cc/rev)
	3	M6 with 13° Cam – 4.0 in^3/rev (66 cc/rev) M7 with 13° Cam – 4.8 in^3/rev (79 cc/rev) M8 with 13° Cam – 5.3 in^3/rev (88 cc/rev)

Code	Shuttle Valve Features
Omit	M*F/M/V/R Motors only
0	Without Orifices
2	With Orifices

Code	External Drive
Omit	None (M*F/G/V/H units only)
A	SAE-A (SAE 82-2) – M6, 7, 8, 11, 14M/N/R/L only
B	SAE-B (SAE 101-2) – M6, 7, 8M/N/R/L SAE-B (SAE 101-2 & 101-4) – M11, 14, 24, 30M/N/R/L
C	SAE-C (SAE 127-2) – M6, 7, 8M/N/R/L SAE-C (SAE 127-2 & 127-4) – M11, 14, 24, 30M/N/R/L
D	SAE-D (SAE 152-4) – M11, 14, 24, 30M/N/R/L only
E	SAE-E (SAE 165-4) – M11, 14, 24, 30M/N/R/L only
F	SAE-F (SAE 177-4) – M24, 30M/N/R/L only
M	Blanking Plate-less Coupling

Code	External Mounting
0	No External Motor Mounted
1	External Motor Mounted (must be separately specified) – Requires Special Modification "-M2"
2	ATEX Externally Mounted Motor

Code	Special Modifications
Omit	None
NP	No Paint
M2	Other Special Modification (example: bronze caged barrel bearing for low viscosity fluids, tandem motors, etc.)
EX	ATEX APPROVED (May contain additional modifications. Contact tech support.)

☐ = Omit if not required

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Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, Hydraulics Group, and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods or work described will be referred to as "Products".

1. Terms and Conditions. Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is expressly conditioned on Buyer's assent to these Terms and Conditions and to the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional term or condition of Buyer's order or any other document issued by Buyer.

2. Price Adjustments; Payments. Prices stated on the reverse side or preceding pages of this document are valid for 30 days. After 30 days, Seller may change prices to reflect any increase in its costs resulting from state, federal or local legislation, price increases from its suppliers, or any change in the rate, charge, or classification of any carrier. The prices stated on the reverse or preceding pages of this document do not include any sales, use, or other taxes unless so stated specifically. Unless otherwise specified by Seller, all prices are F.O.B. Seller's facility, and payment is due 30 days from the date of invoice. After 30 days, Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Delivery Dates; Title and Risk; Shipment. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon tender to the carrier at Seller's facility (i.e., when it's on the truck, it's yours). Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's changes in shipping, product specifications or in accordance with Section 13, herein.

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the warranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.

North America

Industrial

USA

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Tel: (52) 81 8156 6000

Europe

Austria
Wiener Neustadt
Tel: (43) 2622 23501 0

Belgium
Nivelles
Tel: (32) 67 280 900

Czech Republic and Slovakia
Klecany
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Denmark
Ballerup
Tel: (45) 4356 0400

Finland
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Tel: (358) 20 753 2500

France
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Germany
Kaarst
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Warsaw
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Portugal
Leca da Palmeira
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Bucharest
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Russia
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Sweden
Spanga
Tel: (46) 8 597 95000

Ukraine
Kiev
Tel: (380) 44 494 2731

United Kingdom
Warwick,
Tel: (44) 1926 317878

Asia Pacific

Australia
Castle Hill
Tel: (61) 2 9634 7777

China
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Shanghai
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Tokyo
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Taiwan
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Bangkok
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Middle East

United Arab Emirates
Abu Dhabi
Tel: (971) 2 678 8587

Latin America

Pan American Division
Miami, FL
Tel: (305) 470 8800

Argentina
Buenos Aires
Tel: (54) 33 2744 4129

Brazil
Cachoeirinha RS
Tel: (55) 51 3470 9144

Venezuela
Caracas
Tel: (58) 212 238 5422

Africa

South Africa
Kempton Park
Tel: (27) 11 961 0700

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Parker Hannifin Corporation
Hydraulic Pump Division
14249 Industrial Parkway
Marysville, OH 43040 USA
phone 937.644.4532
fax 937.642.3639
www.parkerhpd.com